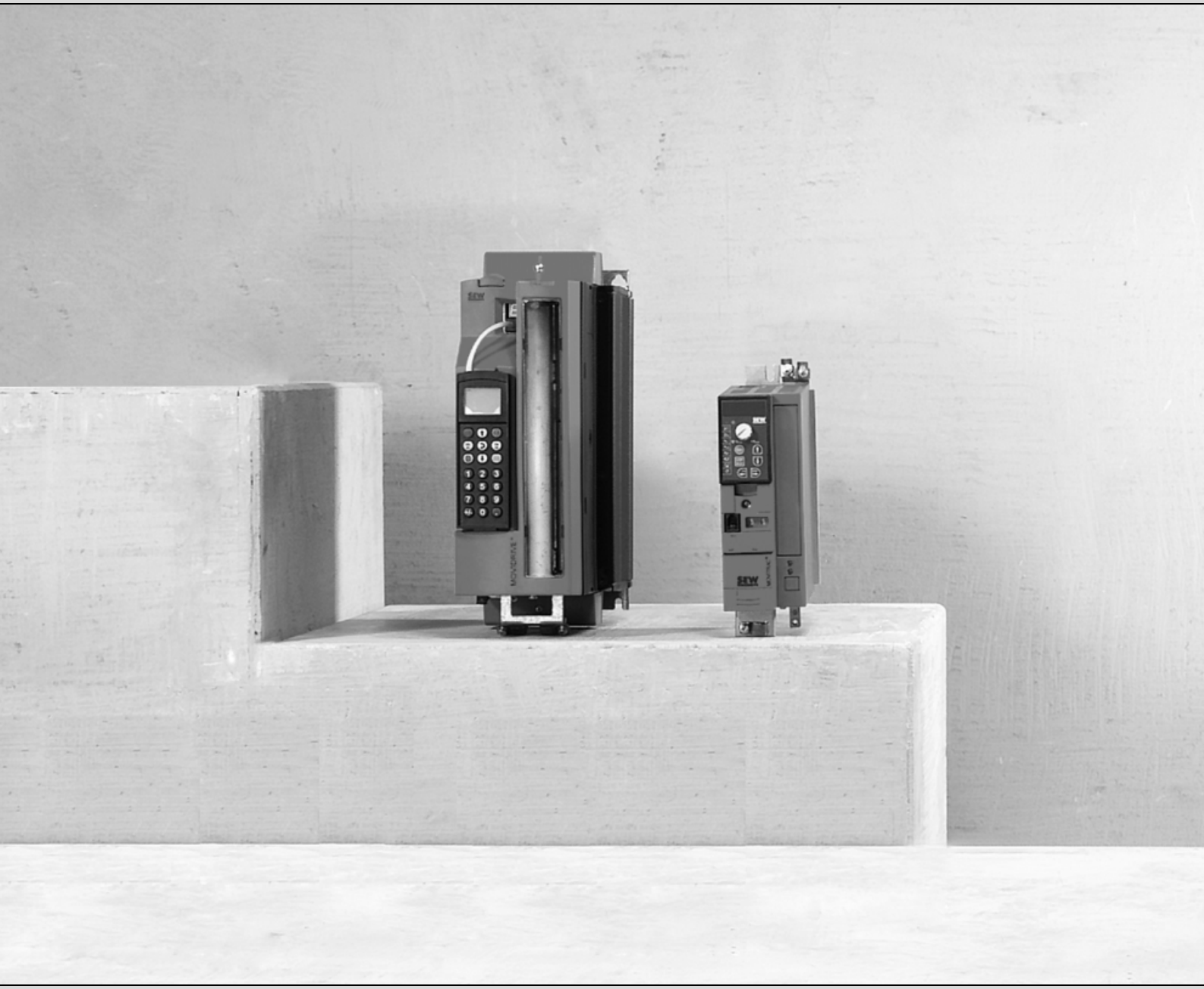
SEW EURODRIVE



Fieldbus Interface DFE33B EtherNet/IP and Modbus/TCP

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Manual

SEW EURODRIVE

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1 General Information

1.1 Using the manual

The manual is part of the product and contains important information on operation and service. The manual is written for all employees who assemble, install, startup, and service the product.

The manual must be accessible and legible. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the manual carefully and understood it. If you are unclear about any of the information in this documentation, or require further information, please contact SEW-EURODRIVE.

1.2 Structure of the safety notes

The safety notes in this manual are designed as follows:

Symbol	SIGNAL WORD
	Nature and source of danger. Possible consequence(s) if disregarded. • Measure(s) to avoid the danger.

Symbol	Signal word	Meaning	Consequences if disregarded
Example: General danger Specific danger, e.g. electric shock	DANGER	Imminent danger	Severe or fatal injuries
	WARNING	Possible dangerous situation	Severe or fatal injuries
	CAUTION	Possible dangerous situation	Minor injuries
	NOTICE	Possible damage to property	Damage to the drive system or its environment
	TIP	Useful information or tip. Simplifies handling of the drive system.	

1.3 Rights to claim under warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the manual. Therefore, read the manual before you start operating the device.

1.4 Exclusion of liability

You must comply with the information in the manual and MOVIDRIVE® B / MOVITRAC® B documentation to ensure safe operation and to achieve the specified product characteristics and performance features. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

1.5 Copyright

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Copyright law prohibits the duplication (all or in part), modification, distribution, and use of this document for ulterior purposes.

2 Safety Notes

2.1 Other applicable documentation

- Installation and startup only by trained personnel observing the relevant accident prevention regulations and the following documents:
  - "MOVIDRIVE® MDX60B/61B" operating instructions
  - "MOVITRAC® B" operating instructions
- Read through these documents carefully before you commence installation and startup of the DFE33B option.
- As a prerequisite to fault-free operation and fulfillment of warranty claims, you must adhere to the information in the documentation.

2.2 General safety notes for bus systems

This communication system allows you to adjust the MOVIDRIVE® inverter to your specific application conditions with a high degree of accuracy. As with all bus systems, there is a danger of invisible, external (as far as the inverter is concerned) modifications to the parameters which give rise to changes in the unit behavior. This may result in unexpected (not uncontrolled) system behavior.

2.3 Safety functions

The MOVIDRIVE® MDX60B/61B and MOVITRAC® B inverters may not perform safety functions without higher-level safety systems. Use higher-level safety systems to ensure protection of equipment and personnel.

For safety applications, ensure that the information in the publications "Safe Disconnection for MOVIDRIVE® B / MOVITRAC® B" is observed.

2.4 Hoist applications

MOVIDRIVE® MDX60B/61B and MOVITRAC® B may not be used as safety equipment in hoist applications.

Use monitoring systems or mechanical protection devices as safety equipment to avoid possible damage to property or injury to people.

2.5 Product names and trademarks

The brands and product names named in this manual are trademarks or registered trademarks of the titleholders.

2.6 Waste disposal

Please observe current national regulations.

Dispose of the following materials separately in accordance with the country-specific regulations in force, as:

- Electronics scrap
- Plastic
- Sheet metal
- Copper

3 Introduction

3.1 Content of the manual

This user manual describes

- Installation of the DFE33B option card in the MOVIDRIVE® MDX61B inverter.
- Using the DFE33B option card in the MOVITRAC® B frequency inverter and in the UOH11B gateway housing.
- Startup of MOVIDRIVE® B in the EtherNet/IP and Modbus/TCP fieldbus system.
- Startup of MOVITRAC® B in the EtherNet/IP and Modbus/TCP gateway.
- Operating MOVITOOLS® MotionStudio via Ethernet.
- Diagnostics via integrated web server.

3.2 Additional documentation

For information on how to connect MOVIDRIVE® / MOVITRAC® B easily and effectively to the EtherNet/IP fieldbus system, you should request the following additional publications about fieldbus technology:

- MOVIDRIVE® Fieldbus Unit Profile manual
- MOVITRAC® B / MOVIDRIVE® MDX60B/61B system manual

The "MOVIDRIVE® Fieldbus Unit Profile" manual and the MOVITRAC® B system manual provide a description of the fieldbus parameters and their coding, as well as an explanation of the various control concepts and application options with brief examples.

The "MOVIDRIVE® Fieldbus Unit Profile" manual contains a list of all parameters of the inverter that can be read or written via the various communication interfaces, such as system bus, RS485 and also via the fieldbus interface.

3.3 Properties

With the DFE33B option and its powerful universal fieldbus interface, MOVIDRIVE® MDX61B inverters and MOVITRAC® B frequency inverters allow for connection to higher-level automation systems via EtherNet/IP or Modbus/TCP.

3.3.1 Fieldbus operation with MOVIDRIVE® B and MOVITRAC® B

The performance of the inverter (also referred to as the unit profile) that forms the basis for fieldbus operation, is fieldbus-independent and, therefore, uniform. This feature allows the user to develop fieldbus-independent drive applications. This makes it much easier to change to other bus systems, such as DeviceNet (option DFD).

3.3.2 Access to all information

With the fieldbus interfaces of option DFE33B, all SEW drives allow digital access to all drive parameters and functions. The inverter is controlled via fast, cyclic process data. With this process data channel, you can enter setpoints such as the setpoint speed, ramp generator time for acceleration/deceleration, etc. as well as trigger various drive functions such as enable, control inhibit, normal stop, rapid stop, etc. At the same time, you can use this channel to read back actual values from the inverter, such as the actual speed, current, unit status, fault number and reference signals.

3.3.3 Monitoring functions

Using a fieldbus system requires additional monitoring functions for the drive technology, for example, time monitoring of the fieldbus (fieldbus timeout) or rapid stop concepts. For example, you can adapt MOVIDRIVE® / MOVITRAC® monitoring functions specifically to your application. You can determine, for example, which of the inverter's error responses should be triggered in the event of a bus error. A rapid stop is a good idea for many applications, although this can also be achieved by "freezing" the last setpoints so the drive continues operating with the most recently valid setpoints (such as with a conveyor belt). As the control terminals also function in fieldbus operation, you can still implement fieldbus-independent emergency stop concepts via the terminals of the inverter.

3.3.4 Diagnostics

The MOVIDRIVE® inverter and the MOVITRAC® B frequency inverter offer you numerous diagnostic options for startup and service. You can, for instance, use the fieldbus monitor integrated in MOVITOOLS® MotionStudio to control setpoint values sent from the higher-level controller as well as the actual values. The integrated web server allows you to access the diagnostic values using a standard browser (such as Internet Explorer).

3.3.5 Fieldbus monitor

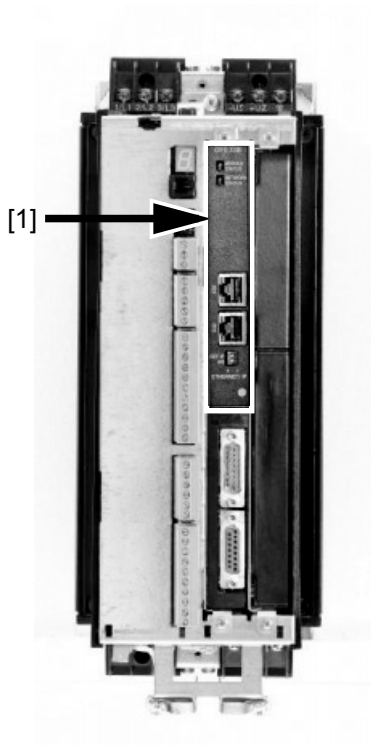
Furthermore, you are supplied with a variety of additional information about the status of the fieldbus interface. The fieldbus monitor function in conjunction with MOVITOOLS® MotionStudio PC software offers you an easy-to-use diagnostic tool for setting all drive parameters (including the fieldbus parameters) and for displaying the fieldbus and device status information in detail.

4 Assembly and Installation Instructions

This section provides information about assembly and installation of the DFE33B option card in MOVIDRIVE® MDX61B, MOVITRAC® B and UOH11B gateway housing.

4.1 Installing the DFE33B option card in MOVIDRIVE® MDX61B

	TIPS
	• **Only SEW-EURODRIVE personnel may install or remove option cards for MOVIDRIVE® MDX61B size 0.** • **Users may only install or remove option cards for MOVIDRIVE® MDX61B sizes 1 to 6.** • Plug the DFE33B EtherNet/IP option card into the fieldbus slot [1]. • Only use connectors and cables approved for EtherNet/IP when cabling. • The DFE33B option is supplied with voltage via MOVIDRIVE® B. A separate voltage supply is not required.



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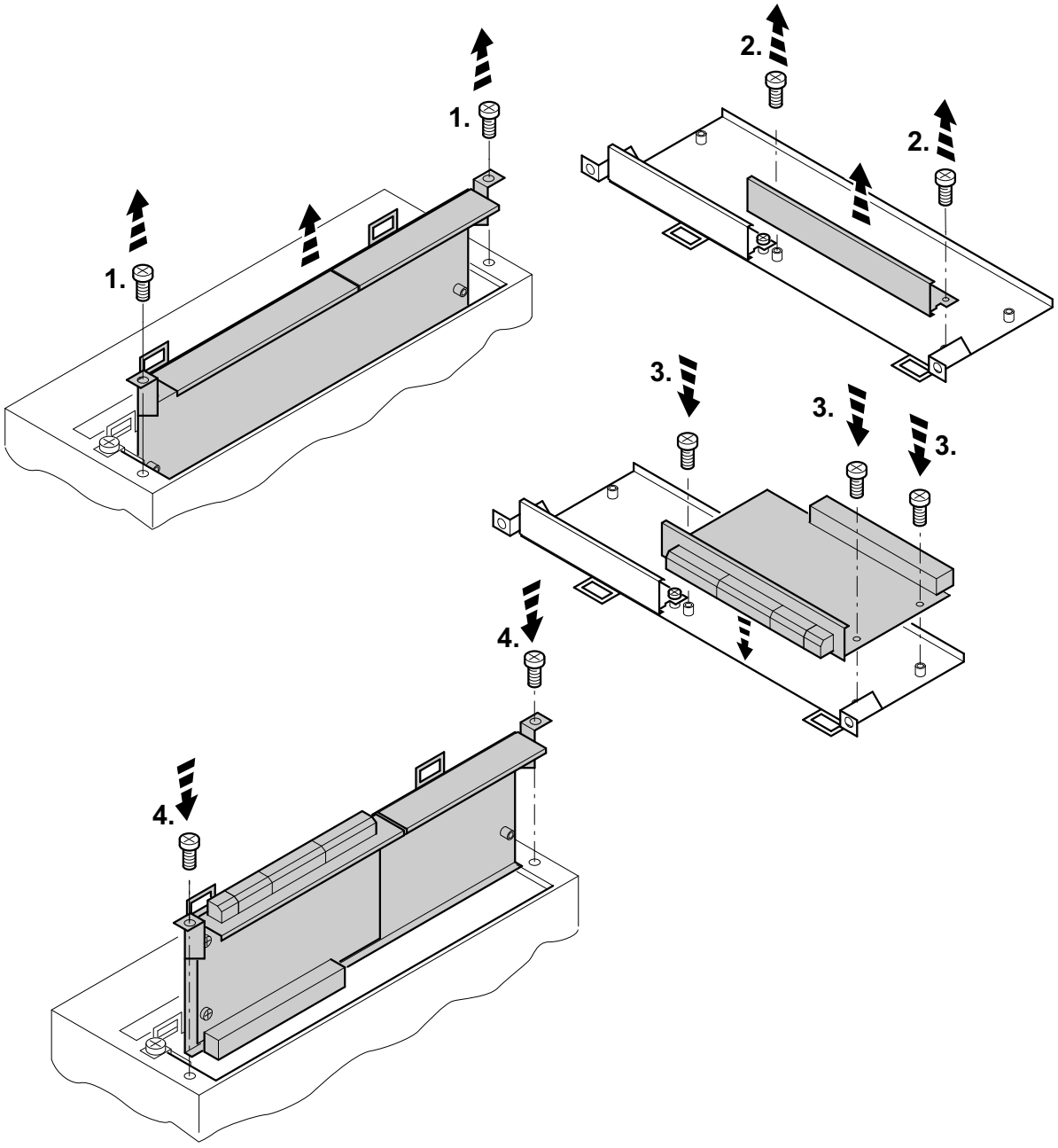
4.1.1 Before you begin

Observe the following notes before installing or removing an option card:

- Disconnect the inverter from the power. Switch off the DC 24 V and the supply voltage.
- Take appropriate measures to protect the option card from electrostatic charge (use discharge strap, conductive shoes, and so on) before touching it.
- **Before installing** the option card, remove the keypad and the front cover (see MOVIDRIVE® MDX60B/61B operating instructions, section "Installation").
- **After having installed** the option card, replace the keypad and the front cover (see MOVIDRIVE® MDX60B/61B operating instructions, section "Installation").
- Keep the option card in its original packaging until immediately before you are ready to install it.
- Hold the option card by its edges only. Do not touch any components.

4.1.2 Basic procedure for installing/removing an option card (MDX61B, sizes 1 – 6)



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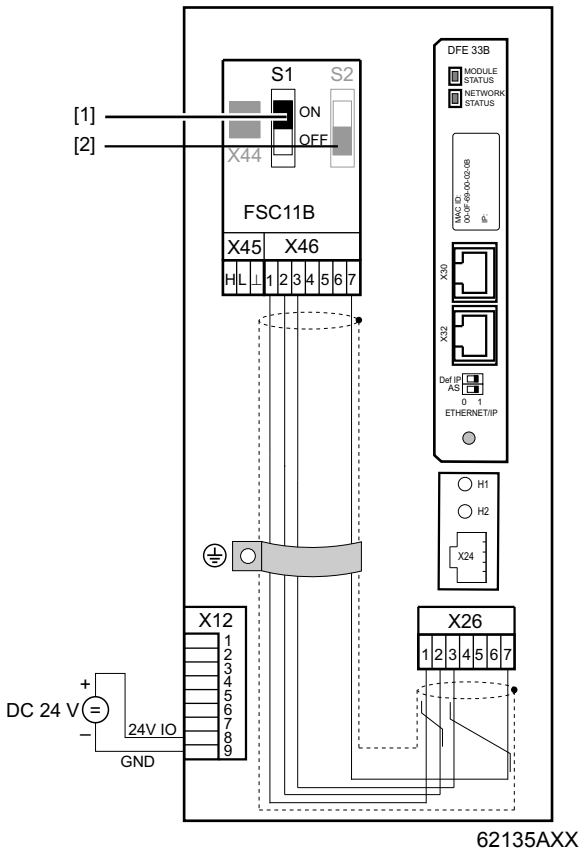
1. Remove the two retaining screws holding the card retaining bracket. Pull the card retaining bracket out evenly from the slot (do not twist!).
2. Remove the two retaining screws of the black cover plate on the card retaining bracket. Remove the black cover plate.
3. Position the option card onto the retaining bracket so that the three retaining screws fit into the corresponding bores on the card retaining bracket.
4. Insert the retaining bracket with installed option card into the slot, pressing slightly so it is seated properly. Secure the card retaining bracket with the two retaining screws.
5. To remove the option card, follow the instructions in reverse order.

4.2 Installing the DFE33B option card in MOVITRAC® B

	TIP
	Only SEW-EURODRIVE engineers are allowed to install or remove option cards for MOVITRAC® B.

4.2.1 Connecting the system bus between a MOVITRAC® B unit and the DFE33B option



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[1] Terminating resistor activated, S1 = ON

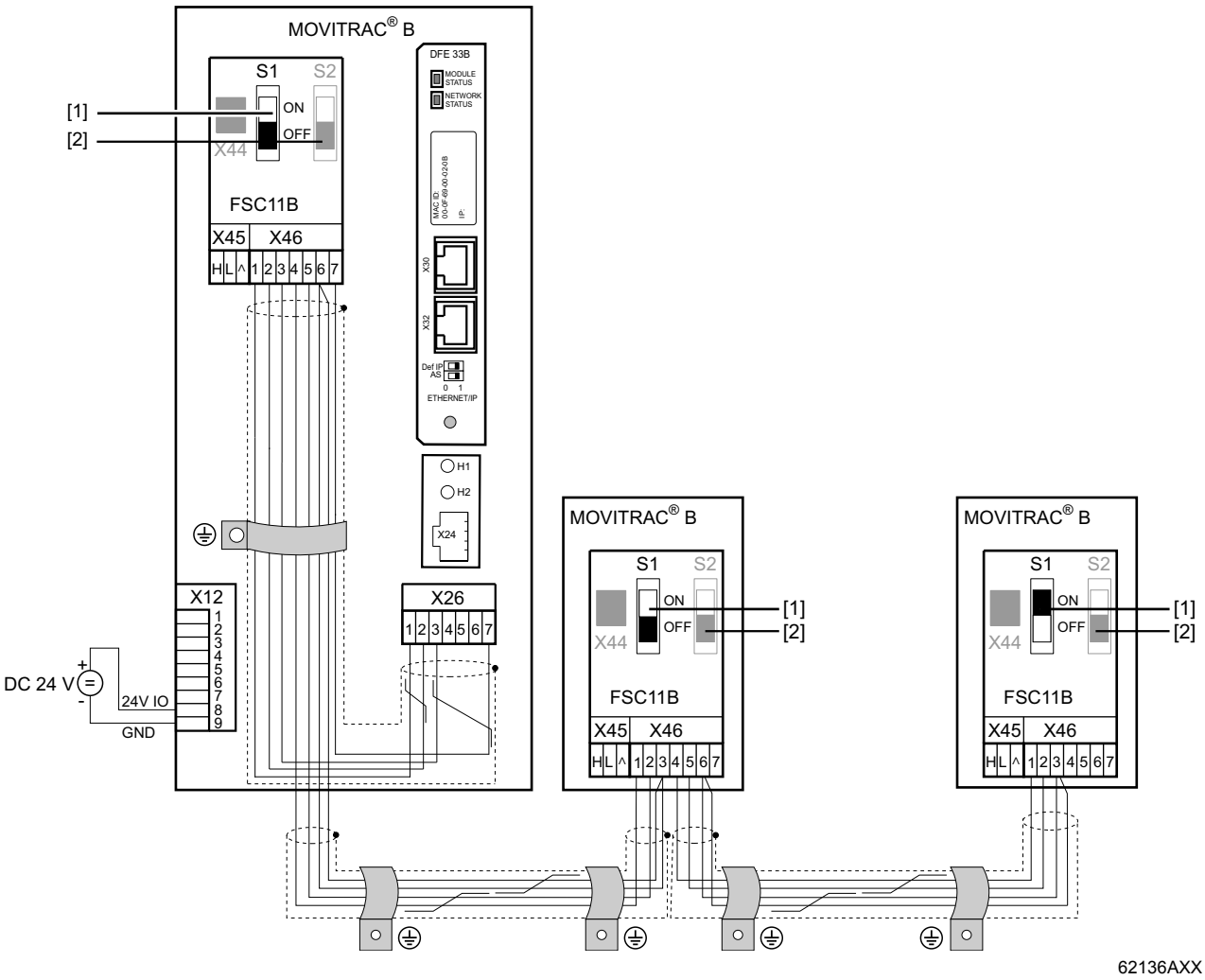
[2] DIP switch S2 (reserved), S2 = OFF

X46	X26	Terminal assignment
X46:1	X26:1	SC11 SBus +, CAN high
X46:2	X26:2	SC12 SBus –, CAN low
X46:3	X26:3	GND, CAN GND
	X26:4	Reserved
	X26:5	Reserved
X46:6	X26:6	GND, CAN GND
X46:7	X26:7	DC 24 V

X12	Terminal assignment
X12:8	DC+24 V input
X12:9	GND reference potential for binary inputs

To simplify cabling, the DFE33B option can be supplied with DC 24 V from X46.7 of the MOVITRAC® B to X26.7. MOVITRAC® B must be supplied with DC 24 V at terminals X12.8 and X12.9 when it supplies the DFE33B option. Activate the system bus terminating resistor at the FSC11B option (S1 = ON).

4.2.2 Connecting the system bus between several MOVITRAC® B units



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[1] **Only** the terminating resistor at the last unit is activated, S1 = ON

[2] DIP switch S2 (reserved), S2 = OFF

MOVITRAC® B		**DFE33B in the UOH11B gateway housing**	
X46	**Terminal assignment**	**X26**	**Terminal assignment**
X46:1	SC11 (System bus high, incoming)	X26:1	SC11 SBus +, CAN high
X46:2	SC12 (System bus low, incoming)	X26:2	SC12 SBus –, CAN low
X46:3	GND (System bus reference)	X26:3	GND, CAN GND
X46:4	SC21 (System bus high, outgoing)	X26:4	Reserved
X46:5	SC22 (System bus low, outgoing)	X26:5	Reserved
X46:6	GND (System bus reference)	X26:6	GND, CAN GND
X46:7	DC 24 V	X26:7	DC 24 V

X12	**Terminal assignment**
X12:8	DC+24 V input
X12:9	GND reference potential for binary inputs

Please note:

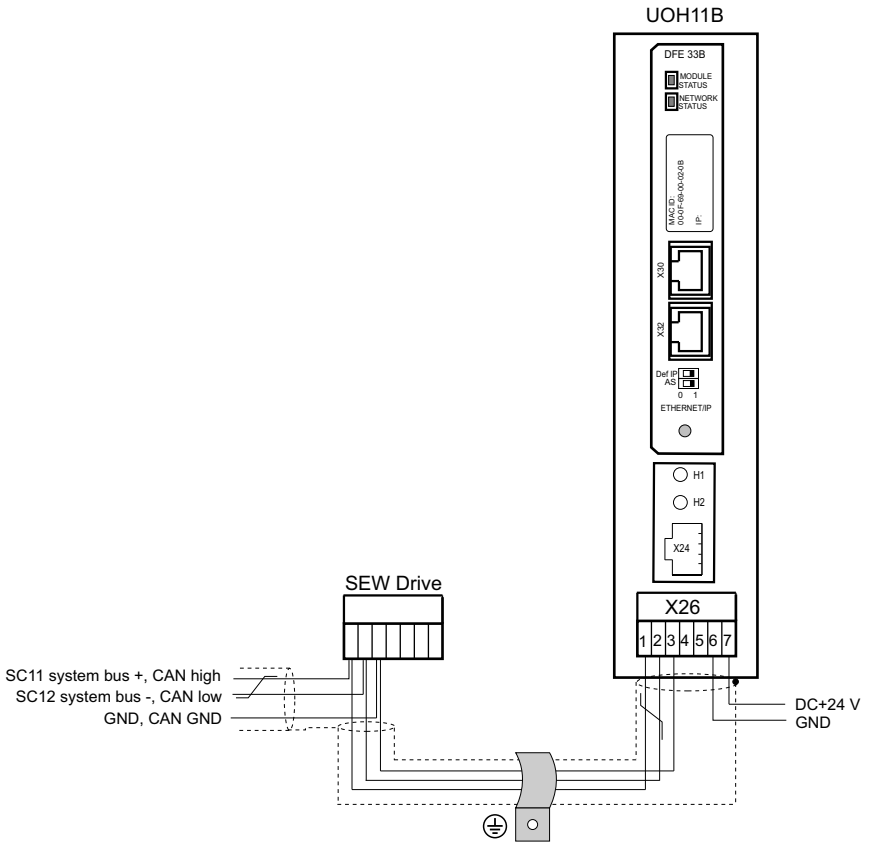
- Use a 2x2 core twisted and shielded copper cable (data transmission cable with braided copper shield). Connect the shield flatly on both sides of the electronics shield clamp of MOVITRAC®. Also connect the ends of the shield to GND. The cable must meet the following specifications:
  - Core cross section 0.25 mm^2 (AWG18) to 0.75 mm^2 (AWG23)
  - Cable resistance 120 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m at 1 kHz
    Suitable cables are CAN bus or DeviceNet cables.
- The permitted total cable length is 100 m (328 ft). The SBus baud rate has a fixed setting of 500 kBaud.
- Connect the system bus terminating resistor (S1 = ON) at the end of the system bus connection. Switch off the terminating resistor on the other units (S1 = OFF). The DFE33B gateway must always be connected either at the beginning or the end of the system bus connection. The terminating resistor is permanently installed.

	TIPS
	• There must not be any potential displacement between the units connected with the SBus. Take suitable measures to avoid potential displacement, such as connecting the unit ground connectors using a separate cable. • Point-to-point SBus wiring is not permitted.

4.3 Installing the DFE33B gateway / UOH11B

The following figure shows the connection of the DFE33B option via the UOH11B gateway housing.

	TIP
	Only SEW-EURODRIVE engineers are allowed to install or remove option cards in/from the UOH11B gateway housing.



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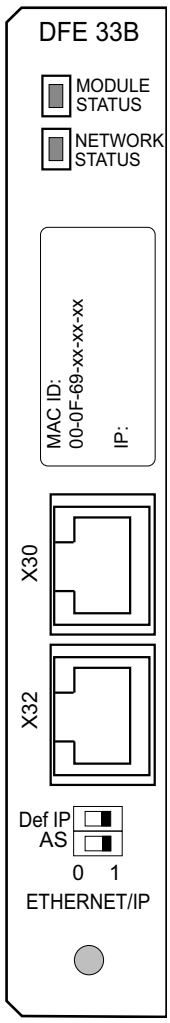
UOH11B gateway housing	
X26	**Terminal assignment**
X26:1	SC11 system bus +, CAN high
X26:2	SC12 system bus –, CAN low
X26:3	GND, CAN GND
X26:4	Reserved
X26:5	Reserved
X26:6	GND, CAN GND
X26:7	DC 24 V

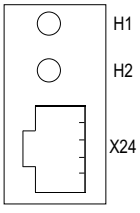
The gateway housing requires a power supply of DC 24 V that is connected to X26.

Connect the system bus terminating resistor at the end of the system bus connection.

4.4 Connection and terminal description of the DFE33B option

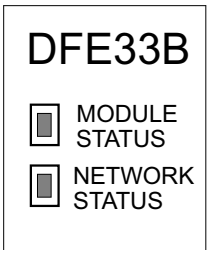
Part number EtherNet/IP and Modbus/TCP fieldbus interface option type DFE33B: 1821 346 4

Front view of DFE33B	Description	DIP switch	Function
	**MODULE STATUS LED (red/green)** **NETWORK STATUS LED (red/green)**		Shows the current status of the DFE33B option. Shows the status of the controlling EtherNet/IP or Modbus/TCP connection.
	MAC address **IP input field** **X30: Ethernet connection** **Link LED (green)** **Activity LED (yellow)** **X32: Ethernet connection** **Link LED (green)** **Activity LED (yellow)**		MAC address, e.g. to configure the DHCP server. You can enter the allocated IP address in this field.
	DIP switch	**DEF IP** **AS**	Resets the address parameters to their default values and deactivates DHCP • IP address: 192.168.10.4 • Subnetwork mask: 255.255.255.0 • Gateway: 1.0.0.0 Auto Setup for gateway operation

Front view of MOVITRAC® B and UOH11B	Description	Function
	**LED H1 (red)** **LED H2 (green)** **X24 X terminal**	System bus error (only for gateway functions) Reserved RS485 interface for diagnostics via PC and MOVITOOLS® MotionStudio (only for MOVITRAC® B)

4.5 Status LED of the DFE33B option

The LEDs of the DFE33B option card indicate the current status of the DFE33B option and the fieldbus system.



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The fieldbus interface status indicated by the respective status LED is summarized in the section "Troubleshooting".

MODULE STATUS LED

The **MODULE STATUS** LED indicates that the bus electronics are operating correctly.

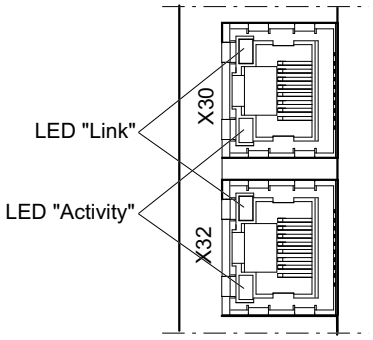
States of the MODULE STATUS LED	Meaning
Off	The DFE33B option card is not supplied with voltage or is defective
Flashing green	• If the NETWORK STATUS LED is off at the same time, the TCP/IP stack of the DFE33B option card will be started. If this status continues and DHCP is activated, the DFE33B option card waits for data from the DHCP server. • If the NETWORK STATUS LED is flashing green at the same time, the application of the DFE33B option card is started.
Flashing green/red	The DFE33B option card performs a LED test.
Green	The standard operating state of the DFE33B option card.
Red	The DFE33B option card is in fault state.
Flashing red	A conflict has been detected in the IP address assignment. Another station in the network uses the same IP address.

NETWORK STATUS LED

The **NETWORK STATUS** LED indicates the state of the fieldbus system.

States of the NETWORK STATUS LED	Meaning
Off	The DFE33B option does not yet have any IP parameters.
Flashing green/red	The DFE33B option card performs a LED test.
Flashing green	There is no controlling IO connection.
Green	There is a controlling EtherNet/IP or Modbus/TCP connection.
Red	A conflict has been detected in the IP address assignment. Another station in the network uses the same IP address.
Flashing red	The previously established controlling IO connection is in timeout status. The status is reset by restarting communication.

Link/Activity LED The two LEDs **Link (green)** and **Activity (yellow)**, integrated in the RJ45 plug connectors (X30, X32), display the status of the Ethernet connection.



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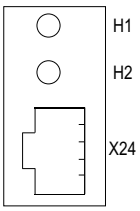
LED / status	Meaning
Link / green	There is an Ethernet connection.
Activity / yellow	Data is currently being exchanged via Ethernet.
Link / off	There is no Ethernet connection.
Link (X30) / flashes	Locating function of Address Editor (see section 10)

TIP

As the firmware of the DFE33B option card takes approx. 15 seconds for initialization, the status "0" (inverter not ready) is displayed in the 7-segment display of MOVIDRIVE® during this time.

4.5.1 Gateway LED

LEDs H1 and H2 indicate the communication status in gateway operation.



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LED H1 Sys-fault (red)	Only for gateway operation	
Status	**State**	**Description**
Red	System bus error	Gateway not configured or one of the drives is inactive
Off	SBus ok	Gateway is configured correctly
Flashing	Bus scan	Bus is being checked by the gateway

- LED **H2** (green) is currently reserved.
- X-terminal X24 is the RS485 interface for diagnostics via PC and MOVITOOLS® MotionStudio.

4.6 Pin assignment

Use prefabricated, shielded RJ45 plug connectors compliant with IEC 11801 edition 2.0, category 5.

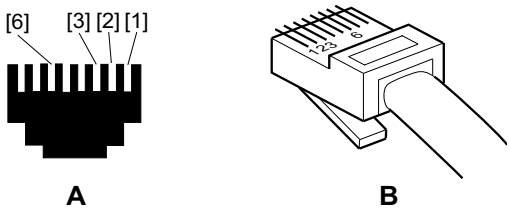


Fig. 1: Pin assignment of an RJ45 plug connector

A = Front view
B = View from back
[1] Pin 1 TX+ Transmit Plus
[2] Pin 2 TX– Transmit Minus
[3] Pin 3 RX+ Receive Plus
[6] Pin 6 RX– Receive Minus

MOVIDRIVE® / MOVITRAC® B / Ethernet connection

To connect DFE33B to the Ethernet, connect the Ethernet interface X30 or X32 (RJ45 plug connector) to the other network stations using a category 5, class D twisted-pair cable in accordance with IEC 11801 edition 2.0. The integrated switch provides support for achieving a line topology and offers auto-crossing functions.

	TIPS
	• According to IEC 802.3, the maximum cable length for 10/100 MBaud Ethernet (10BaseT / 100BaseT), e.g. between two network stations, is 100 m. • We recommend that you do not directly connect terminals to the DFE33B option in order to minimize the load on the terminals caused by undesired multicast data traffic in EtherNet/IP networks. Connect non-SEW devices via a network component that supports the IGMP snooping functionality (e.g. managed switch).

4.7 The integrated Ethernet switch

You can use the integrated Ethernet switch to achieve line topologies known from the fieldbus technology. Other bus topologies such as star or tree are, of course, also possible. Ring topologies are not supported.

	TIP
	The number of industrial Ethernet switches connected in line affects the telegram runtime. If a telegram passes through the units, the telegram runtime is delayed by the Store & Forward function of the Ethernet switch: • for a telegram length of 64 bytes by approximately 10 µs (at 100 Mbit/s) • for a telegram length of 1500 bytes by approximately 130 µs (at 100 Mbit/s) This means, the more units that the telegram has to run through, the longer the telegram runtime.

Auto-crossing

The two ports leading out of the Ethernet switch have auto-crossing functionality. This means you can use both patch cables and cross-over cables to connect to the next Ethernet station.

Autonegotiation

The baud rate and the duplex mode is negotiated by both Ethernet nodes when establishing the connection. The two Ethernet ports of the EtherNet/IP interface support autonegotiation functionality and operate at a baud rate of 100 Mbit or 10 Mbit in full duplex or half duplex mode.

Notes on multicast handling

- The integrated Ethernet switch offers no filter functionality for Ethernet multicast telegrams. Multicast telegrams that are usually sent from the adapters (DFE33B) to the scanners (PLC) are passed on to all switch ports.
- IGMP snooping (e.g. managed switches) is not supported.
- SEW-EURODRIVE therefore recommends to connect the DFE33B option only with network components that support IGMP snooping (e.g. managed switch) or that have safety mechanisms integrated against excess multicast load (e.g. units from SEW-EURODRIVE). Units that do not have this integrated function can fail due to high network loads.

4.8 Shielding and routing bus cables

Only use shielded cables and connection elements that also meet the requirements of category 5, class 2 in compliance with IEC 11801 edition 2.0.

Correct shielding of the bus cable attenuates electrical interference that can occur in industrial environments. The following measures ensure the best possible shielding:

- Manually tighten the mounting screws on the connectors, modules, and equipotential bonding conductors.
- Use only connectors with a metal housing or a metallic housing.
- Connect the shielding in the connector over a wide surface area.
- Apply the shielding of the bus line on both ends.
- Route signal and bus cables in separate cable ducts. Do not route them parallel to power cables (motor leads).

- Use metallic, grounded cable racks in industrial environments.
- Route the signal cable and the corresponding equipotential bonding close to each other using the shortest possible route.
- Avoid using plug connectors to extend bus cables.
- Route the bus cables closely along existing grounding surfaces.

	STOP!
	In case of fluctuations in the ground potential, a compensating current may flow via the bilaterally connected shield that is also connected to the protective earth (PE). Make sure you supply adequate equipotential bonding in accordance with relevant VDE regulations in such a case.

4.9 Setting the DIP switches

	TIP
	The setting of the "Def IP" DIP switch is only adopted with a power-on reset (switching mains and DC 24 V backup voltage on and off).

Def IP

When the "Def IP" switch is set to "1" (= ON), the following default IP address parameters are set when activating the DC 24 V backup voltage:

- IP address: 192.168.10.4
- Subnetwork mask: 255.255.255.0
- Default gateway: 1.0.0.0
- P785 DHCP / Startup configuration: Saved IP parameters (DHCP is deactivated)

AS

The "AS" DIP switch is used to configure the SBus communication of the gateway (see section "Auto Setup for gateway operation").

The configuration becomes active when the "AS" DIP switch is set from "0" to "1". To continue operation, the "AS" DIP switch must remain in the "1" position (= ON).

4.10 TCP/IP addressing and subnetworks

Introduction

The settings for the address of the IP protocol are made using the following parameters:

- MAC address
- IP address
- Subnetwork mask
- Standard gateway

The addressing mechanisms and subdivision of the IP networks into subnetworks are explained in this chapter to help you set the parameters correctly.

MAC address

The MAC address (Media Access Controller) is the basis for all address settings. The MAC address is a worldwide unique 6-byte value (48 bits) assigned to the Ethernet device. SEW Ethernet devices have the MAC address 00-0F-69-xx-xx-xx. The MAC address is difficult to handle for larger networks. This is why freely assignable IP addresses are used.

IP address

The IP address is a 32 bit value that uniquely identifies a station in the network. An IP address is represented by four decimal numbers separated by decimal points.

Example: 192.168.10.4

Each decimal number stands for one byte (= 8 bits) of the address and can also be represented using binary code (→ following table).

Byte 1		Byte 2		Byte 3		Byte 4
11000000	.	10101000	.	00001010	.	00000100

The IP address comprises a network address and a station address (→ following table).

Network address	Station address
192.168.10	4

The part of the IP address that denotes the network and the part that identifies the station is determined by the network class and the subnetwork mask.

Station addresses cannot consist of only zeros or ones (binary) because they represent the network itself or a broadcast address.

Network classes

The first byte of the IP address determines the network class and as such represents the division into network addresses and station addresses.

Value range Byte 1	Network class	Complete network address (Example)	Meaning
0 ... 127	A	10.1.22.3	10 = Network address 1.22.3 = Station address
128 ... 191	B	172.16.52.4	172.16 = Network address 52.4 = Station address
192 ... 223	C	192.168.10.4	192.168.10 = Network address 4 = Station address

This rough division is not sufficient for a number of networks. They also use an explicit, adjustable subnet mask.

Subnetwork mask

A subnetwork mask is used to divide the network classes into even more precisely defined subsections. The subnetwork mask is represented by four decimal numbers separated by decimal points, in the same way as the IP address.

Example: 255.255.255.128

Each decimal number stands for one byte (= 8 bits) of the subnetwork mask and can also be represented using binary code (→ following table).

Byte 1		Byte 2		Byte 3		Byte 4
11111111	.	11111111	.	11111111	.	10000000

If you compare the IP addresses with the subnetwork masks, you see that in the binary representation of the subnetwork mask all ones (1s) determine the network address and all the zeros (0s) determine the station address (→ following table).

		Byte 1		Byte 2		Byte 3		Byte 4
IP address	Decimal	192	.	168.	.	10	.	129
	Binary	11000000	.	10101000	.	00001010	.	10000001
Subnetwork mask	Decimal	255	.	255	.	255	.	128
	Binary	11111111	.	11111111	.	11111111	.	10000000

The class C network with the address 192.168.10. is further subdivided into 255.255.255.128 using the subnetwork mask. Two networks are created with the address 192.168.10.0 and 192.168.10.128.

The following station addresses are permitted in the two networks:

- 192.168.10.1 ... 192.168.10.126
- 192.168.10.129 ... 192.168.10.254

The network stations use a logical AND operation for the IP address and the subnetwork mask to determine whether there is a communication partner in the same network or in a different network. If the communication partner is in a different network, the standard gateway is addressed for passing on the data.

Standard gateway

The standard gateway is also addressed via a 32-bit address. The 32-bit address is represented by four decimal numbers separated by decimal points.

Example: 192.168.10.1

The standard gateway establishes a connection to other networks. In this way, a network station that wants to address another station can use a logical AND operation with the IP address and the subnetwork mask to decide whether the desired station is located in the same network. If this is not the case, the station addresses the standard gateway (router), which must be part of the actual network. The standard gateway then takes on the job of transmitting the data packages.

DHCP (Dynamic Host Configuration Protocol)

Instead of setting the three parameters IP address, subnetwork mask and standard gateway manually, they can be assigned in an automated manner by a DHCP server in the Ethernet network.

This means the IP address is assigned from a table, which contains the allocation of MAC address to IP address.

Parameter P785 indicates whether the DFE33B option expects the IP parameters to be assigned manually or via DHCP.

4.11 Setting the IP address parameters

Initial startup

The "DHCP" protocol (**D**ynamic **H**ost **C**onfiguration **P**rotocol) is activated as the default setting for the DFE33B protocol. This means that the DFE33B option card expects its IP address parameters from a DHCP server.

	TIP
	Rockwell Automation provides a DHCP server free-of-charge on their homepage. The tool is known as "BOOTP Utility" and can be downloaded at the link below: http://www.ab.com/networks/bootp.html.

Once the DHCP server has been configured and the settings have been made for the subnetwork screen and the standard gateway, the DFE33B must be inserted in the assignment list of the DHCP server. In doing so, the MAC ID of the DFE33B option is allocated a valid IP address.

	TIP
	The configured IP address parameters are adopted permanently by the parameter set when DHCP is deactivated after the IP address has been assigned.

Changing the IP address parameters after successful initial startup

If the DFE33B was started using a valid IP address, you can also access the IP address parameters via the Ethernet interface.

The following options are available for changing the IP address parameters via Ethernet:

- Via the homepage of DFE33B (see section "Integrated Web Server")
- Using the MOVITOOLS® MotionStudio software via Ethernet (see section "MOVITOOLS® MotionStudio via Ethernet")
- Using the EtherNet/IP TCP/IP interface object (see section "EtherNet/IP CIP object directory")

You can also change the IP address parameters via the serial interface of the gateway or MOVIDRIVE® MDX61B or using the DBG60B keypad (in MOVIDRIVE® B).

If the IP address parameters are assigned to the option DFE33B via a DHCP server, you can only change the parameters by adjusting the settings of the DHCP server.

The options listed above for changing the IP address parameters only come into effect once the supply voltages (mains **and** DC 24 V) have been switched off and back on again.

Deactivating / activating the DHCP

The type of IP address assignment is determined by the setting of the attribute *Configuration Control* of the EtherNet/IP TCP/IP interface object. The value is displayed or changed in the parameter *P785 DHCP / Startup Configuration*.

- Setting "Saved IP parameters"

  The saved IP address parameters are used.
- Setting "DHCP"

  The IP address parameters are requested by a DHCP server.

  If you use the DHCP server from Rockwell Automation, you can activate or deactivate the DHCP via a button. In this case, an EtherNet/IP telegram is sent to the TCP/IP interface object of the station that is being addressed.

Resetting the IP address parameters

If you do not know the IP address parameters and there is no serial interface or DBG60B keypad for reading the IP address, you can reset the IP address parameters to the default values using the DIP switch "Def IP".

This action resets the DFE33B option to the following default values:

- IP address: 192.168.10.4
- Subnetwork mask: 255.255.255.0
- Default gateway: 1.0.0.0
- P785 DHCP / Startup configuration: Saved IP parameters (DHCP is deactivated)

Proceed as follows to reset the IP address parameters to the default values:

- Switch off the DC 24 V supply voltage and the mains voltage.
- Set the DIP switch "Def IP" on the DFE33B option to "1".
- Switch the DC 24 V supply voltage and the mains voltage back on.

SEW Address Editor

To access the IP settings of the DFE33B interfaces without the Ethernet settings of the PC and DFE33B having to match, the SEW Address Editor can be used if firmware version .11 or higher is installed on the DFE33B.

The IP settings of all SEW units can be made and displayed in the local subnetwork using Address Editor (see section 10).

- This allows the required settings for the PC to be determined for an installation which is in operation to enable access with the required diagnostics and engineering tools via Ethernet.
- When starting up a unit, the IP settings for the DFE33B can be assigned without changing the network connections or PC settings.

	TIP
	• DHCP remains deactivated when you reset the DIP switch "Def IP" to "0". You can re-activate DHCP via the EtherNet/IP TCP/IP interface object (see section "EtherNet/IP CIP object directory"), via the parameter P785, via the integrated web server or via the DHCP server from Rockwell. • DHCP is not activated again when the values are reset to the factory setting (*P802 Factory setting*).

4.12 Procedure for replacing the unit

If the DIP switch "Def IP" of the DFE33B option is set to "1" (= ON), the DIP switch "Def IP" on the new DFE33B must also be set to "1" (= ON) (after the option card has been replaced or after the MOVIDRIVE® B / MOVITRAC® B / gateway housing unit have each been replaced with an option card). Other IP parameter settings are not required.

If the DIP switch "Def IP" of the DFE33B option is set to "0" (= OFF), it is important that you observe the following section when replacing the option card or a unit with option card:

- Section "Replacing MOVIDRIVE® B"
- Section "Replacing MOVITRAC® B / gateway"

4.12.1 Replacing MOVIDRIVE® B

When the DFE33B fieldbus interface is operated as an option card in MOVIDRIVE® B, the procedure for replacement depends on the following factors:

- Whether DHCP is activated or a saved IP address is used
- Whether the memory card of the replaced MOVIDRIVE® MDX61B is plugged into the new unit or not

If DHCP is active, the assignment list of the DHCP server must be updated when the DFE33B option or MOVIDRIVE® B with DFE33B option is replaced. The MAC address of the DFE33B option is printed on its front panel for this purpose.

If DHCP is not active, the IP parameters saved on the memory card of MOVIDRIVE® B will be used.

If the memory card of MOVIDRIVE® B is not plugged into the new unit when replacing it, you will have to perform complete startup of the new inverter (if DHCP is not active including the IP parameters). As an alternative, you can transfer a data backup created with the MOVITOOLS® MotionStudio software or saved in the DBG60B keypad.

Enter the IP address, which is set in the DFE33B or defined in the assignment list of the DHCP server, into the field on the front panel of the DFE33B option for future diagnostic or engineering work.

4.12.2 Replacing MOVITRAC® B / gateway

If the DFE33B fieldbus interface is operated as an option card in MOVITRAC® B or in the UOH11B gateway housing, the procedure for replacement depends on the following factors:

- Whether DHCP is activated or a saved IP address is used
- Whether the DFE33B option is installed in MOVITRAC® B or in the gateway housing

If DHCP is active, the assignment list of the DHCP server must be updated when the DFE33B option or MOVITRAC® B with DFE33B option is replaced. The MAC address of the DFE33B option is printed on its front panel for this purpose.

If DHCP is not active, the IP parameters saved non-volatile on the DFE33B option will be used. Set the IP parameters just as for initial startup. As an alternative, you can copy a parameter file saved with MOVITOOLS® MotionStudio (from version 5.50, service pack 2) to the DFE33B option or use the Address

Editor to set the IP parameters.

If a MOVITRAC® B with DFE33B was replaced by a new unit, inverter startup will have to be performed in addition to setting the IP parameters. Refer to the MOVITRAC® B operating instructions for more information.

Enter the IP address, which is set in the DFE33B or defined in the assignment list of the DHCP server, into the field on the front panel of the DFE33B option for future diagnostic or engineering work.

5 Project Planning and Startup (EtherNet/IP)

This section provides information on project planning for the EtherNet/IP master and startup of the inverter for fieldbus operation. As a prerequisite, the connection and setting of the IP address parameters of DFE33B must be correct according to the section "Assembly and Installation Instructions".

5.1 Validity of the EDS file for DFE33B

	TIP
	Do not change or expand the entries in the EDS file. SEW assumes no liability for inverter malfunctions caused by a modified EDS file!

SEW-EURODRIVE provides two different EDS files for configuring the scanner (EtherNet/IP master).

- If the DFE33B option is installed in MOVIDRIVE® B, the file SEW_MOVIDRIVE_DFE33B.eds is required
- If the DFE33B option is used as a gateway in MOVITRAC® B or in the gateway housing (UOH11B), the file SEW_GATEWAY_DFE33B.eds is required

	TIP
	Current versions of the EDS files for the DFE33B option are available on the SEW homepage (http://www.sew-eurodrive.com) under the heading "Software".

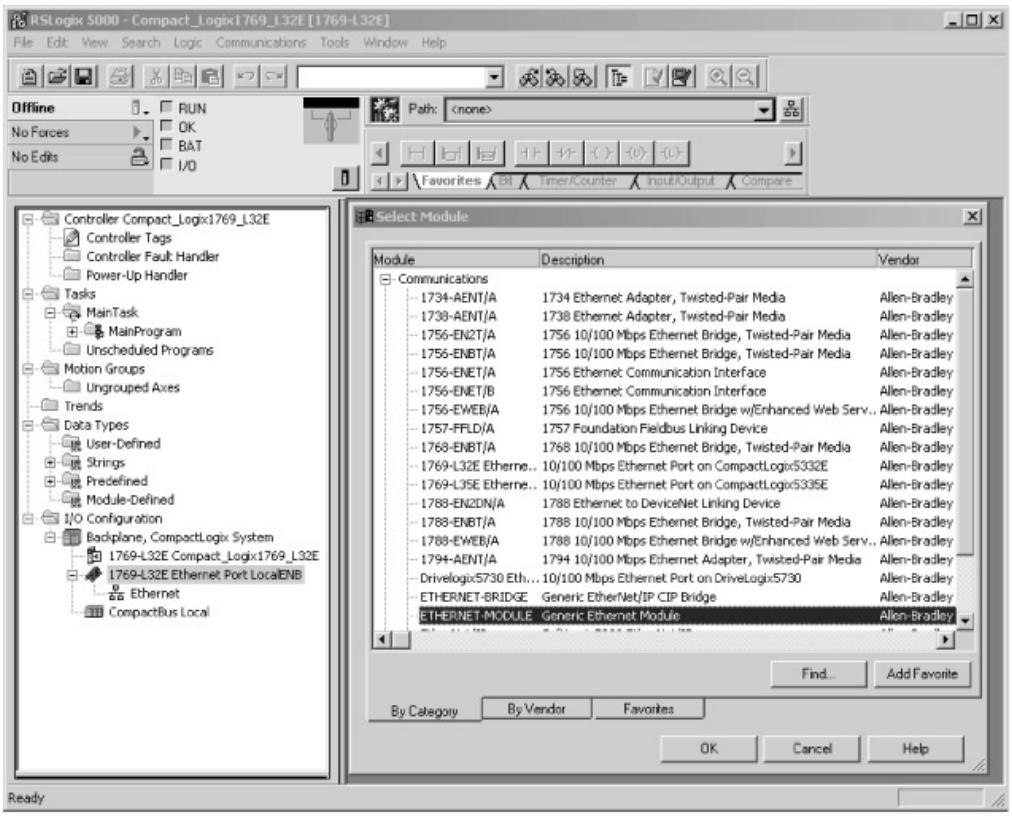
5.2 Configuring the master (EtherNet/IP scanner)

The following example refers to the configuration of the Allen-Bradley CompactLogix 1769-L32E controller with RSLogix 5000 programming software. The EtherNet/IP interface is already integrated in the CPU component of this controller.

	TIP
	If a CPU without an EtherNet/IP interface is used, an Ethernet communication interface must first be added to the IO configuration.

Process data exchange

In the following project planning example, the option DFE33B is added to a project. To do so, go to the "Controller Organizer" screen in the RSLogix 5000 program as shown in the screenshot below (use the tree structure on the left side of the screen).



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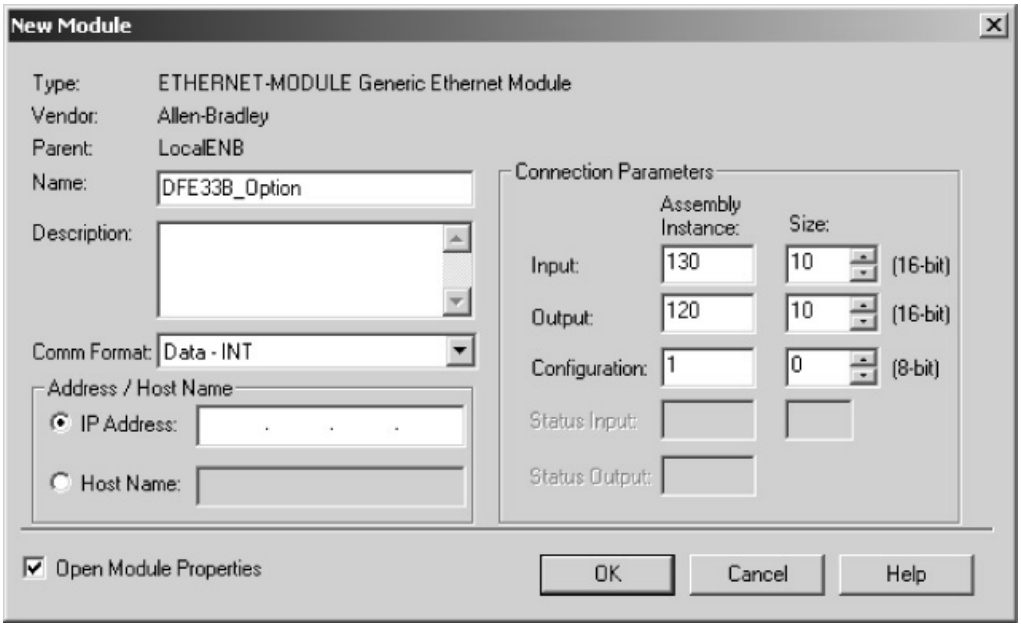
- In the "IO Configuration" folder, select the entry "1769-L32E Ethernet Port LocalENB" as the Ethernet communication interface. Click the right mouse button and select "New Module" from the context menu. The selection window "Select Module Type" appears.
- To add option DFE33B to the project, mark the entry "ETHERNET MODULE" in the "Communications" category. Confirm your selection by clicking <OK>.
- The "New Module" window appears.

5.2.1 Configuring the DFE33B as option in MOVIDRIVE® MDX61B

First enter the name under which the data is stored in the controller tags for the newly created module, and then enter the IP address.



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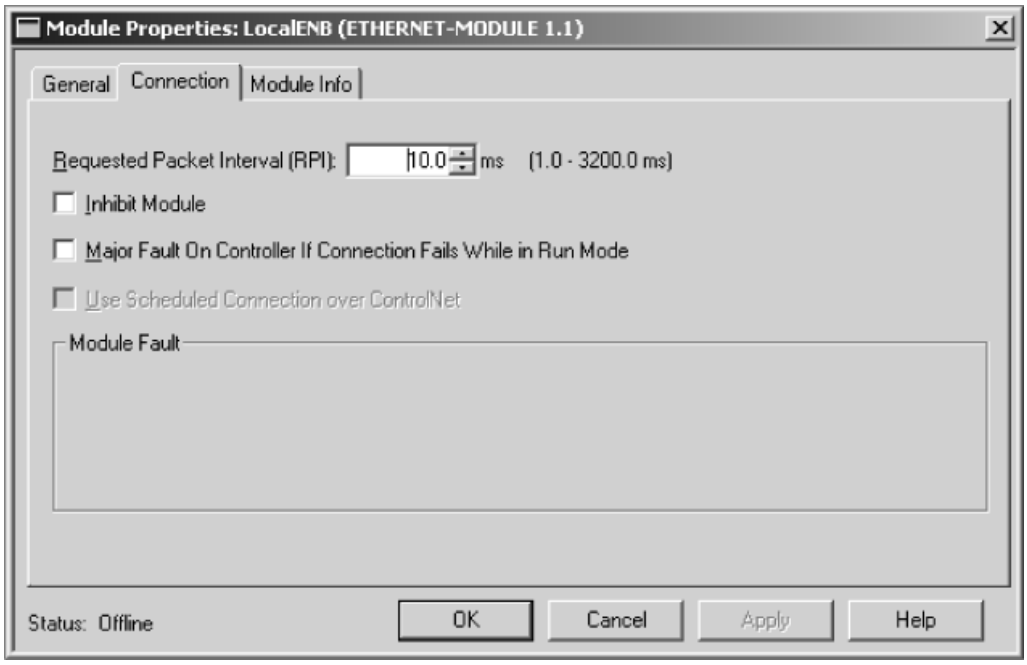
- **In the "Comm Format" dropdown menu, choose the entry "Data – INT" as the data format. Process data for DFE33B always contains 16 bits (INT).**
- In the "Connection Parameters" group area, enter the value "130" in the "Input Assembly Instance" input field. The input data of the PLC must be linked to the output instance of DFE33B.
- To establish a controlling connection, in the "Connection Parameters" group box, enter the value "120" in the "Output Assembly Instance" input field. The input data of the PLC must be linked to the output instance of DFE33B.
- In the selection fields "Input Size" and "Output Size", set a maximum value of "10" (16 bit) as the data length.
- In the "Configuration Size" selection field, enter the value "0". The "Configuration Assembly Instance" input field is not used in this case.
- Click <OK> to continue.
- To ensure compatibility with existing DeviceNet configurations, you can also choose the data type "SINT" in the "Comm Format" selection field. In this case, you must ensure that an even number of bytes (2 to 20) is configured and that data consistency is maintained during operation when the IO data is accessed.

Other settings

On the "Connection" tab page you can set the data rate and, if necessary, the error response of the controller.



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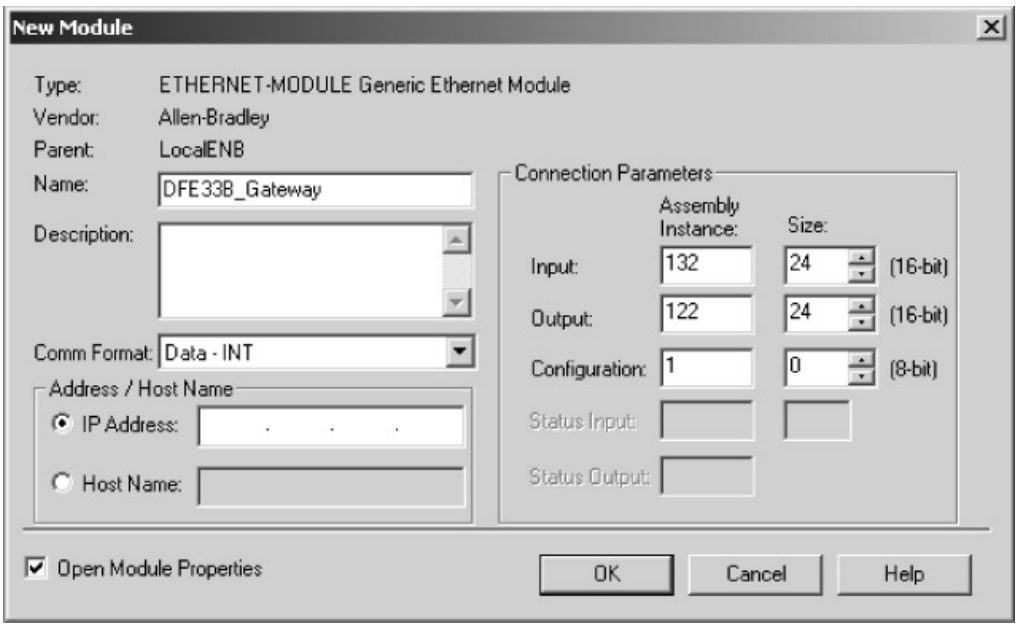
- The DFE33B option supports a minimum data rate (input field "Requested Packet Interval (RPI)") of 4 ms. Longer cycle times can be implemented without any problems.
- Click the <OK> button. You have now configured process data exchange with a DFE33B.

5.2.2 Configuring the DFE33B as option in MOVITRAC® B or in the UOH11B gateway housing

First enter the name under which the data is stored in the controller tags for the newly created module, and then enter the IP address.



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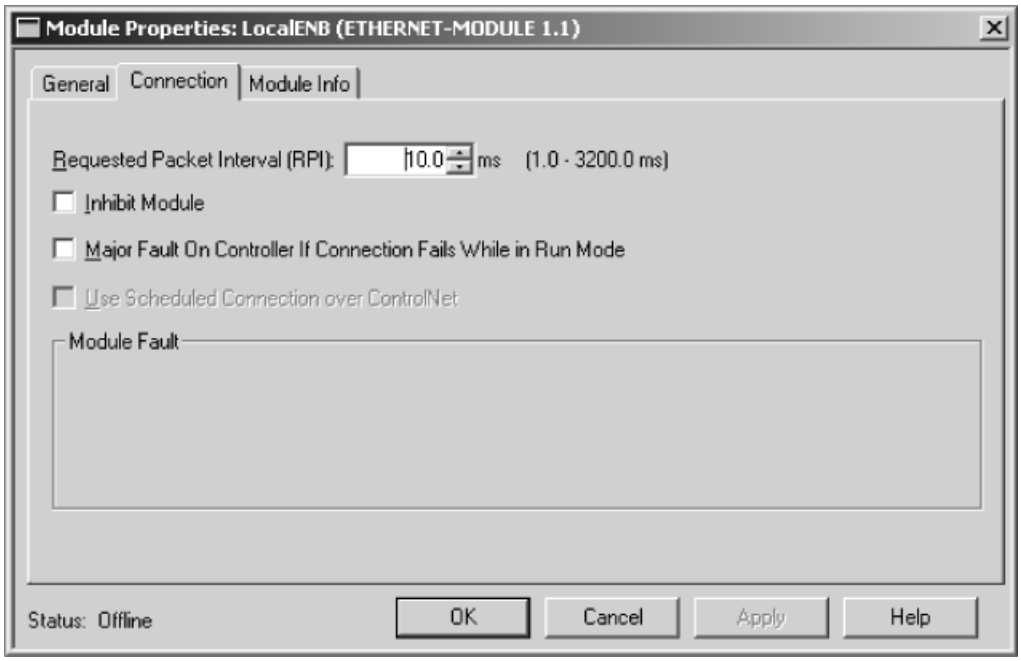
- **In the "Comm Format" dropdown menu, choose the entry "Data – INT" as the data format. Process data for DFE33B always contains 16 bits (INT).**
- In the "Connection Parameters" group box, enter the value "132" in the "Input Assembly Instance" input field. The input data of the PLC must be linked to the output instance of DFE33B.
- To establish a controlling connection, in the "Connection Parameters" group box enter the value "122" in the "Output Assembly Instance" input field. The input data of the PLC must be linked to the output instance of DFE33B.
- In the selection fields "Input Size" and "Output Size", set a maximum value of "24" (16 bit) as the data length. The value depends on the number of lower-level SBus stations (max. 8). Three process data words are exchanged with every lower-level station. Therefore, choose a multiple of 3 as data length.
- In the "Configuration Size" selection field, enter the value "0". The "Configuration Assembly Instance" input field is not used in this case.
- Click <OK> to continue.
- To ensure compatibility with existing DeviceNet configurations, you can also choose the data type "SINT" in the "Comm Format" selection field. In this case, you must ensure that an even number of bytes (6 to 48) is configured and that data consistency is maintained during operation when IO data is accessed.

Other settings

On the "Connection" tab page you can set the data rate and, where applicable, the error response of the controller.



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- The DFE33B option supports a minimum data rate (input field "Requested Packet Interval (RPI)") of 4 ms. Longer cycle times can be implemented without any problems.
- Click the <OK> button. You have now configured process data exchange with a DFE33B.

5.2.3 Auto Setup for gateway operation

The Auto Setup function enables startup of the DFE33B as gateway to be performed without a PC. Activate the function with the Auto Setup DIP switch (see section 4.4 on page 18).

	TIP
	Switching on the Auto Setup (AS) DIP switch causes the function to be executed once. **The Auto Setup DIP switch must then remain in the ON position.** The function can be performed again by switching the DIP switch off and back on again.

As a first step, the DFE33B searches for inverters on the lower-level SBus. This process is indicated by the LED **H1** (system error) flashing briefly. For this purpose, different SBus addresses must be set for the inverters (P881). We recommend assigning the addresses beginning with address 1 in ascending order based on the arrangement of inverters in the control cabinet. The process image on the fieldbus side is expanded by three words for each detected inverter.

LED **H1** remains lit if no inverter was located. A total of up to eight inverters is taken into account.

After the search is completed, the DFE33B periodically exchanges three process data words with each connected inverter. The process output data is taken from the fieldbus, divided into blocks of three and transmitted. The inverters read the process input data, put it together and send it to the fieldbus master.

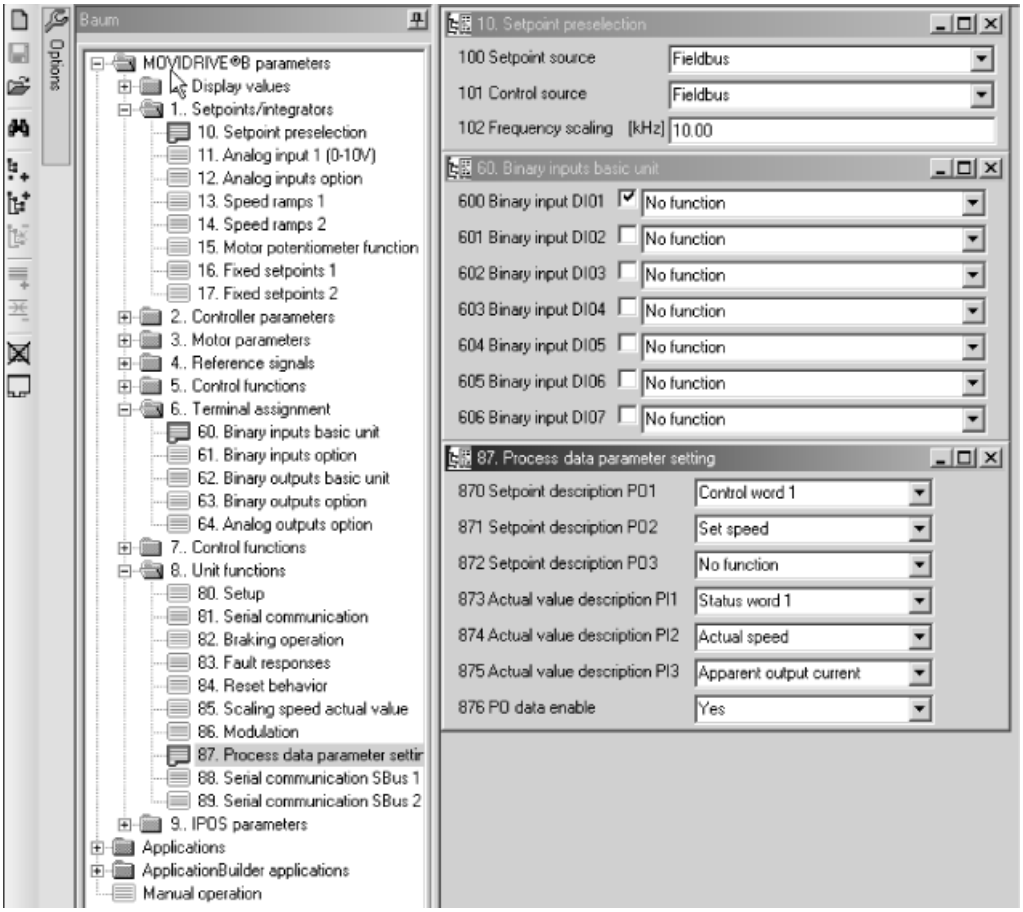
The cycle time of the SBus communication is 2 ms per station at a baud rate of 500 kBit/s without any additional engineering activities.

For an application with 8 inverters on the SBus, the cycle time of the process data update is then 8 x 2 ms = 16 ms.

	TIP
	If you change the process data assignment of the inverters connected to the DFE33B, you have to activate Auto Setup again because the DFE33B saves these values only once during Auto Setup. At the same time, the process data assignments of the connected inverters may not be changed dynamically after Auto Setup.

5.3 Setting the MOVIDRIVE® MDX61B inverter

The following settings must be made for simple fieldbus operation.



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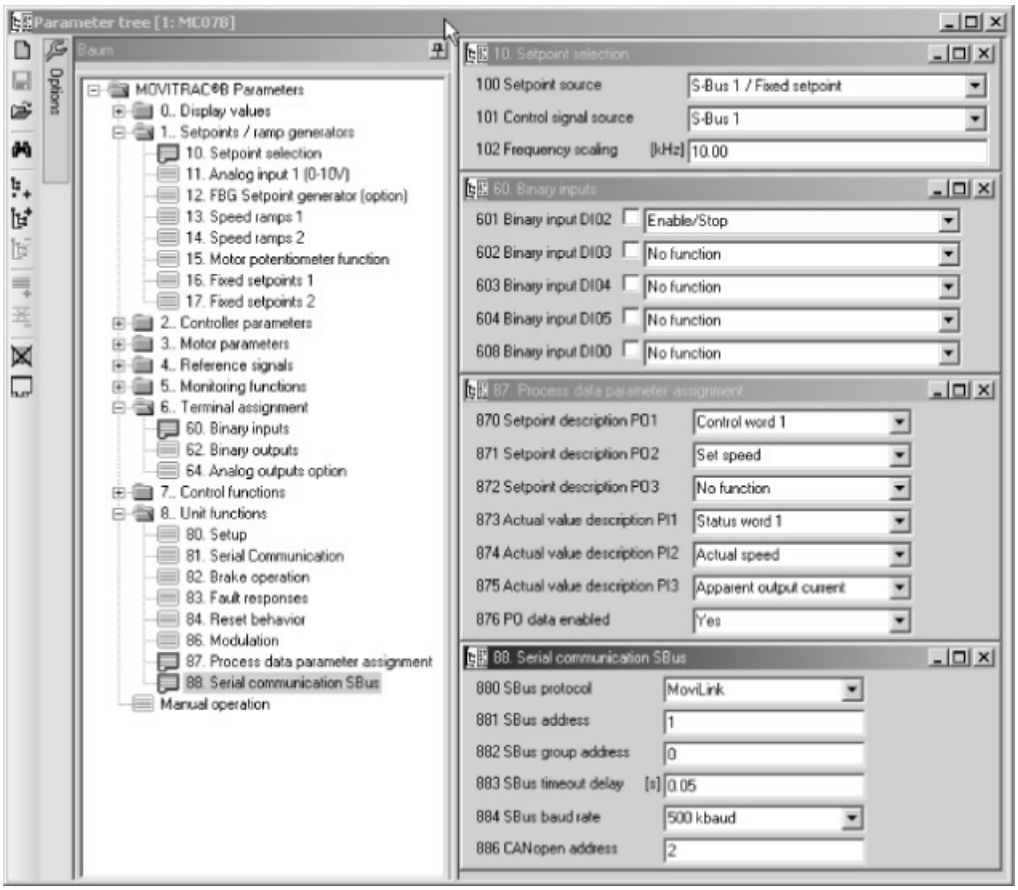
However, to control the MOVIDRIVE® B inverter via EtherNet/IP, you must first switch the inverter to control signal source (P101) and setpoint source (P100) = FIELDBUS. The FIELDBUS setting means the inverter parameters are set for control and setpoint entry via EtherNet/IP. The MOVIDRIVE® B inverter then responds to the process output data transmitted by the master programmable controller.

The parameters of the MOVIDRIVE® B inverter can be set straight away via EtherNet/IP without any further settings once the EtherNet/IP option card has been installed. For example, all parameters can be set by the master programmable controller after being switched-on.

Activation of the control signal source and setpoint source FIELDBUS is signaled to the higher-level controller using the "Fieldbus mode active" bit in the status word.

For safety reasons, you must also enable the MOVIDRIVE® B inverter at the terminals for control via the fieldbus system. Therefore, you must wire and program the terminals in such a way that the inverter is enabled via the input terminals. For example, the simplest way of enabling the inverter at the terminals is to connect the DIØØ (function /CONTROL INHIBIT) input terminal to a +24 V signal and to program input terminals DIØ1 to DIØ7 to NO FUNCTION.

5.4 Setting the MOVITRAC® B frequency inverter



11639AXX

To control the MOVITRAC® B frequency inverter via EtherNet/IP, you must first set the inverter to *Control signal source (P101)* and *Setpoint source (P100)* = SBus. The SBus setting means the MOVITRAC® B parameters are set for control and setpoint entry via gateway. MOVITRAC® B then responds to the process output data transmitted by the PLC.

It is necessary to set the SBus1 timeout interval (P883) to a value other than 0 ms for the MOVITRAC® B inverter to stop if faulty SBus communication occurs. We recommend a value in the range 50 to 200 ms. Activation of the control signal source and setpoint source SBus is signaled to the higher-level controller using the "SBus mode active" bit in the status word.

For safety reasons, you must also enable MOVITRAC® B at the terminals for control via the fieldbus system. Therefore, you must wire and program the terminals in such a way that MOVITRAC® B is enabled via the input terminals. The simplest way of enabling MOVITRAC® B at the terminals is, for example, to connect the DIØ1 (function CW/STOP) input terminal to a +24 V signal and to program the remaining input terminals to NO FUNCTION.

TIPS

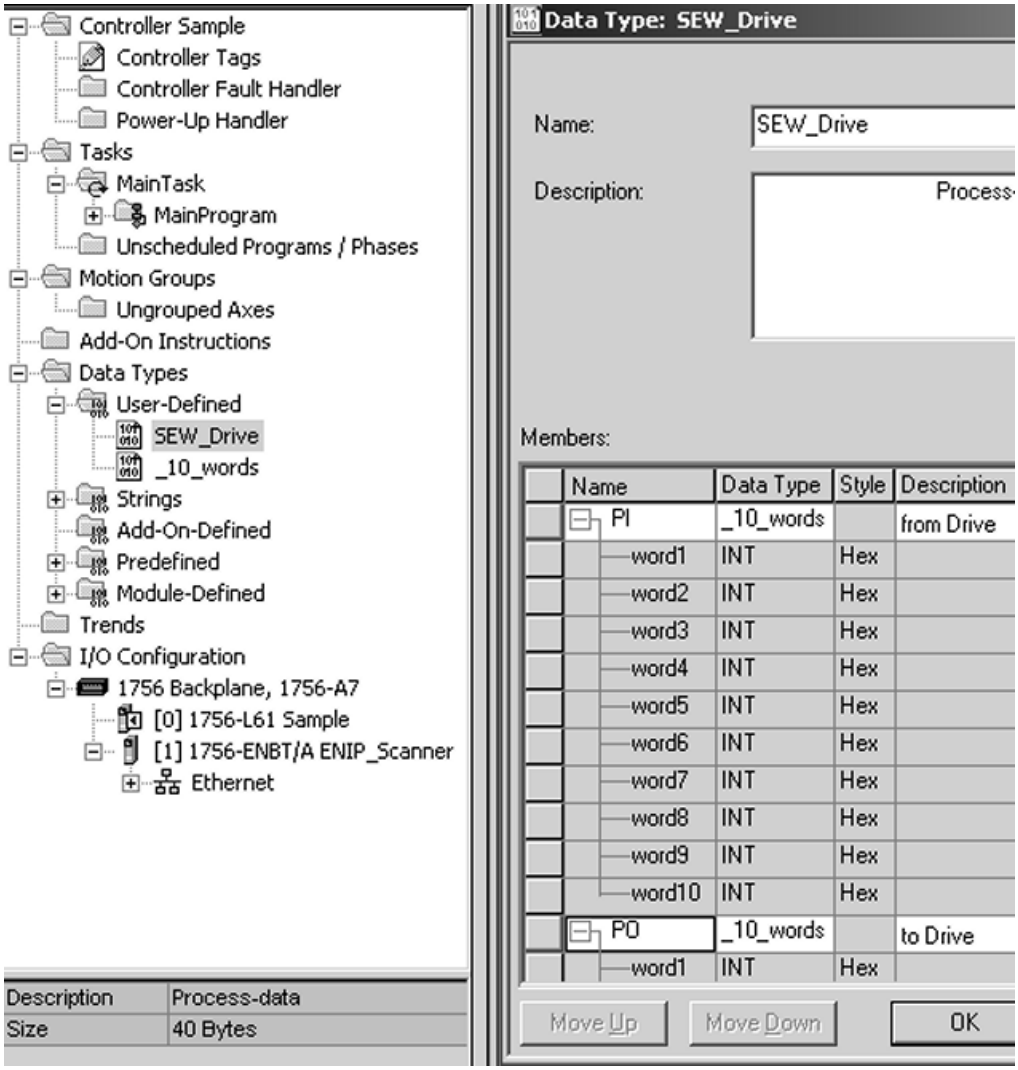
- Set the parameter *P881 SBus address* to values of 1 to 8 and upwards in ascending order.
- The SBus address 0 is used by DFE33B gateway and therefore must not be used.
- Set *P883 SBus timeout* to values between 50 and 200 ms.

5.5 Project planning examples in RSLogix5000

5.5.1 MOVIDRIVE® B with 10 PD data exchange

1. Set the IP address of the DFE33B (see section "Setting the IP address parameters").
2. Then follow sections 5.2 and 5.2.1 to add MOVIDRIVE® B with DFE33B to the EtherNet/IP configuration.
3. Set the communication parameters of MOVIDRIVE® B as described in section 5.3.
4. Integration into the RSLogix project can now begin.

   To do so, create a controller tag with a user-defined data type to create a simple, data consistent interface to the inverter's process data (see following figure).



11783AXX

The description for PI and PO data of the controller tag can match the definition of the process data (PD) in MOVIDRIVE® B (see section 5.3).

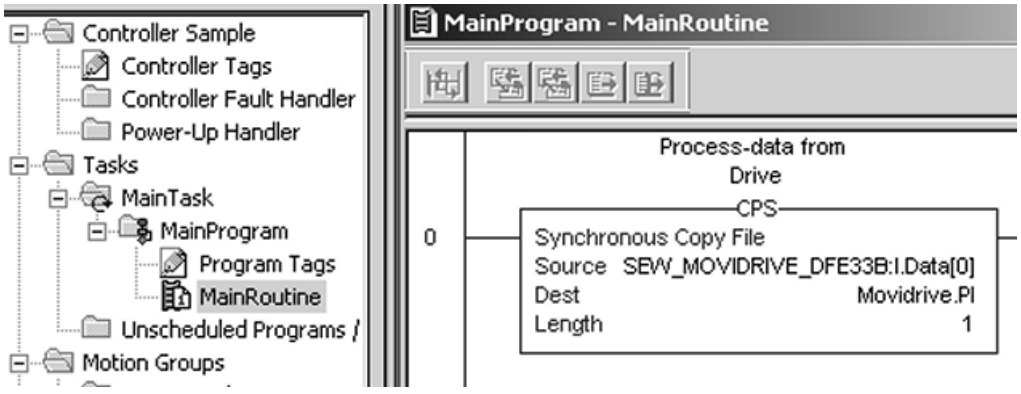
Controller Tags - Sample(controller)

Scope: Sample | Show... | Show All

Name	Alias For	Data Type	Style	Description
Movidrive		SEW_Drive		Process-data
Movidrive.PI		_10_words		Process-data from Drive
Movidrive.PI.word1		INT	Hex	Status Word 1
Movidrive.PI.word2		INT	Hex	Actual Speed
Movidrive.PI.word3		INT	Hex	Apparent Output Current
Movidrive.PI.word4		INT	Hex	IPos-PI_word4
Movidrive.PI.word5		INT	Hex	IPos-PI_word5
Movidrive.PI.word6		INT	Hex	IPos-PI_word6
Movidrive.PI.word7		INT	Hex	IPos-PI_word7
Movidrive.PI.word8		INT	Hex	IPos-PI_word8
Movidrive.PI.word9		INT	Hex	IPos-PI_word9
Movidrive.PI.word10		INT	Hex	IPos-PI_word10
Movidrive.PO		_10_words		Process-data to Drive
Movidrive.PO.word1		INT	Hex	Control Word 1
Movidrive.PO.word2		INT	Hex	Set Speed
Movidrive.PO.word3		INT	Hex	No Function
Movidrive.PO.word4		INT	Hex	IPos-PO_word4
Movidrive.PO.word5		INT	Hex	IPos-PO_word5
Movidrive.PO.word6		INT	Hex	IPos-PO_word6
Movidrive.PO.word7		INT	Hex	IPos-PO_word7
Movidrive.PO.word8		INT	Hex	IPos-PO_word8
Movidrive.PO.word9		INT	Hex	IPos-PO_word9
Movidrive.PO.word10		INT	Hex	IPos-PO_word10

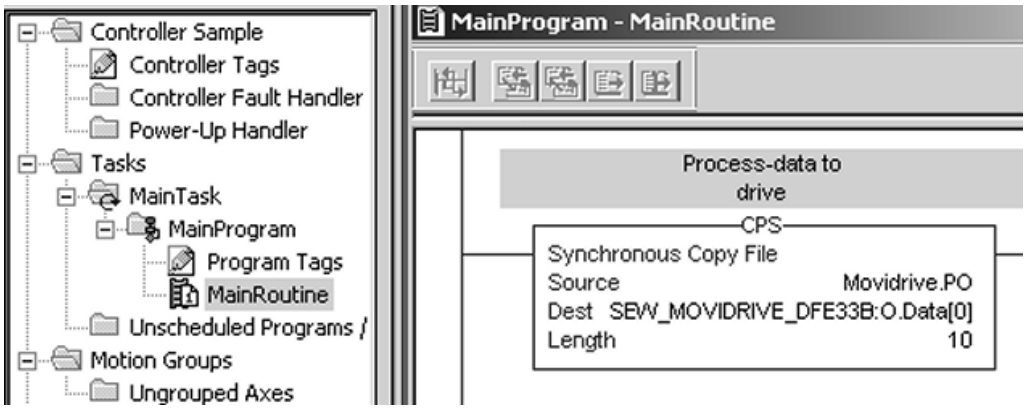
11784AXX

5. To copy the data from the drive to the new data structure, insert a CPS command at the start of the "MainRoutine" (see following figure).



11785AXX

To copy the data from the new data structure to the drive, insert a CPS command at the end of the "MainRoutine" (see following figure).



11786AXX

6. Now save the project and transfer it to the PLC. The PLC is set to RUN mode.
   The actual values can now be read from the drive and setpoint values can be written.

Controller Tags - Sample(controller)

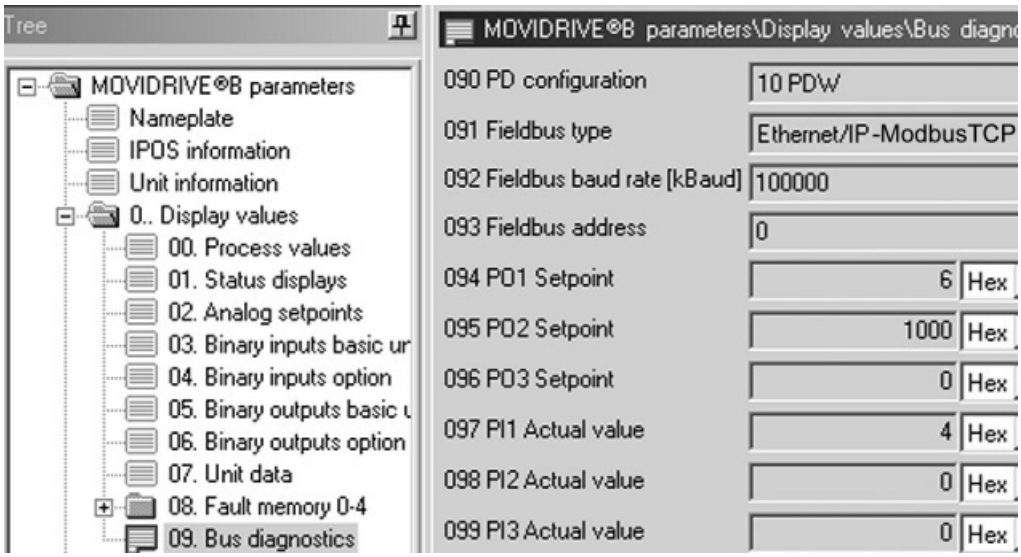
Scope: Sample | Show... | Show All

Name	Value	Style	Data Type	Description
Movidrive	{...}		SEW_Drive	Process-data
Movidrive.PI	{...}		_10_words	Process-data from Drive
Movidrive.PI.word1	16#0004	Hex	INT	Status Word 1
Movidrive.PI.word2	16#0000	Hex	INT	Actual Speed
Movidrive.PI.word3	16#0000	Hex	INT	Apparent Output Current
Movidrive.PI.word4	16#0000	Hex	INT	IPos-PI_word4
Movidrive.PI.word5	16#0000	Hex	INT	IPos-PI_word5
Movidrive.PI.word6	16#0000	Hex	INT	IPos-PI_word6
Movidrive.PI.word7	16#0000	Hex	INT	IPos-PI_word7
Movidrive.PI.word8	16#0000	Hex	INT	IPos-PI_word8
Movidrive.PI.word9	16#0000	Hex	INT	IPos-PI_word9
Movidrive.PI.word10	16#0000	Hex	INT	IPos-PI_word10
Movidrive.PO	{...}		_10_words	Process-data to Drive
Movidrive.PO.word1	16#0006	Hex	INT	Control Word 1
Movidrive.PO.word2	16#1000	Hex	INT	Set Speed
Movidrive.PO.word3	16#0000	Hex	INT	No Function
Movidrive.PO.word4	16#0000	Hex	INT	IPos-PO_word4
Movidrive.PO.word5	16#0000	Hex	INT	IPos-PO_word5
Movidrive.PO.word6	16#0000	Hex	INT	IPos-PO_word6
Movidrive.PO.word7	16#0000	Hex	INT	IPos-PO_word7
Movidrive.PO.word8	16#0000	Hex	INT	IPos-PO_word8
Movidrive.PO.word9	16#0000	Hex	INT	IPos-PO_word9
Movidrive.PO.word10	16#0000	Hex	INT	IPos-PO_word10

Monitor Tags | Edit Tags

11787AXX

The process data should correspond with the values displayed in the MOVITOOLS® MotionStudio parameter tree (see following figure).

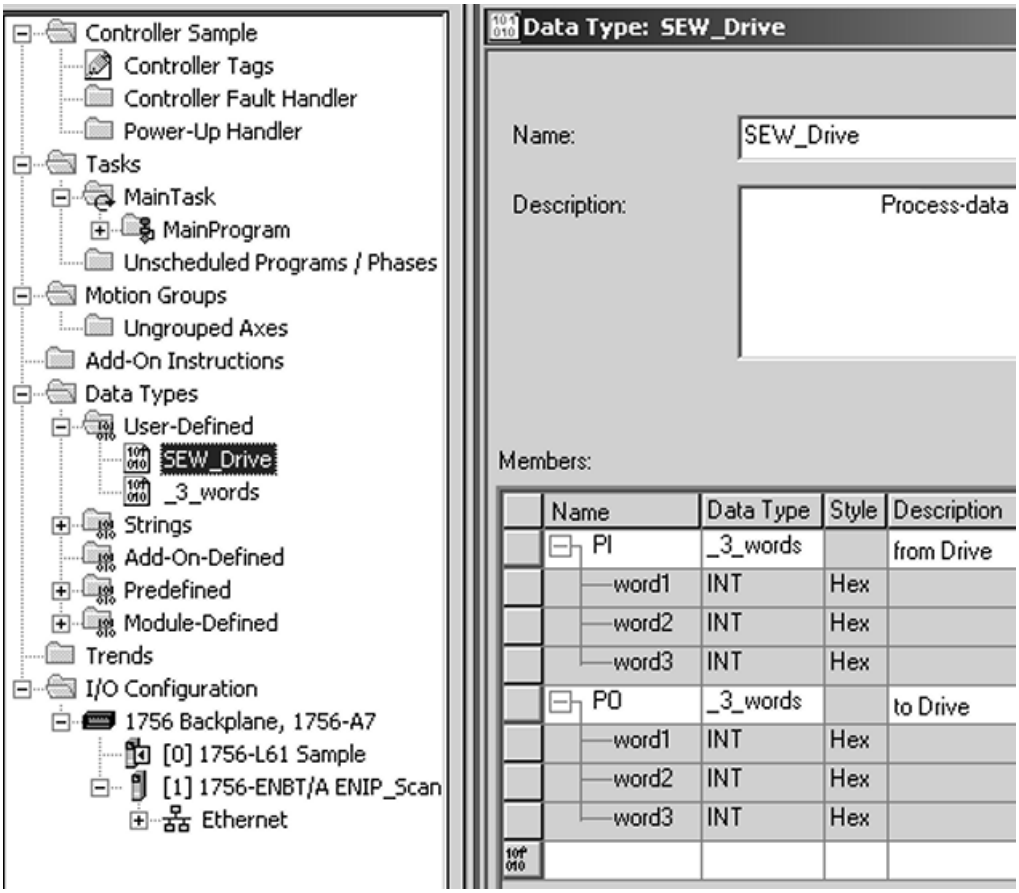


12048AXX

5.5.2 MOVITRAC® B via gateway DFE33B / UOH11B

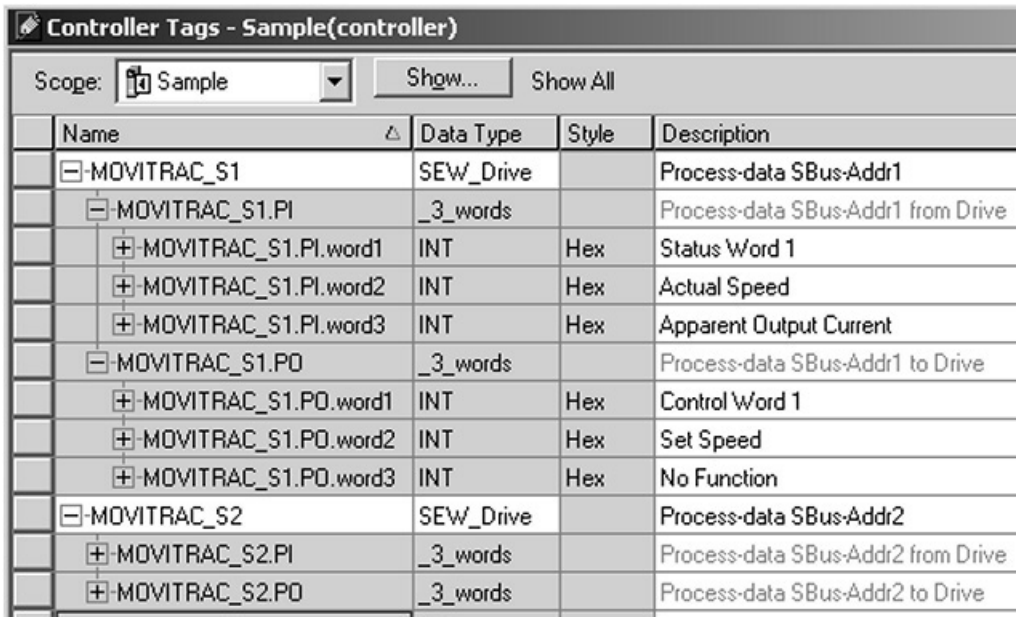
1. Set the IP address of the DFE33B option (see section "Setting the IP address parameters").
2. Add the DFE33B gateway to the EtherNet/IP configuration as described in sections 5.2 and 5.2.2.
3. Execute the Auto Setup function of the DFE33B gateway according to section 5.3 to configure the data mapping to the drives.
4. Set the communication parameters of MOVITRAC® B as described in section 5.4.
5. Integration into the RSLogix project can now begin.

   To do so, create a controller tag with a user-defined data type to create a simple, data consistent interface to the inverter's process data (see following figure).



11789AXX

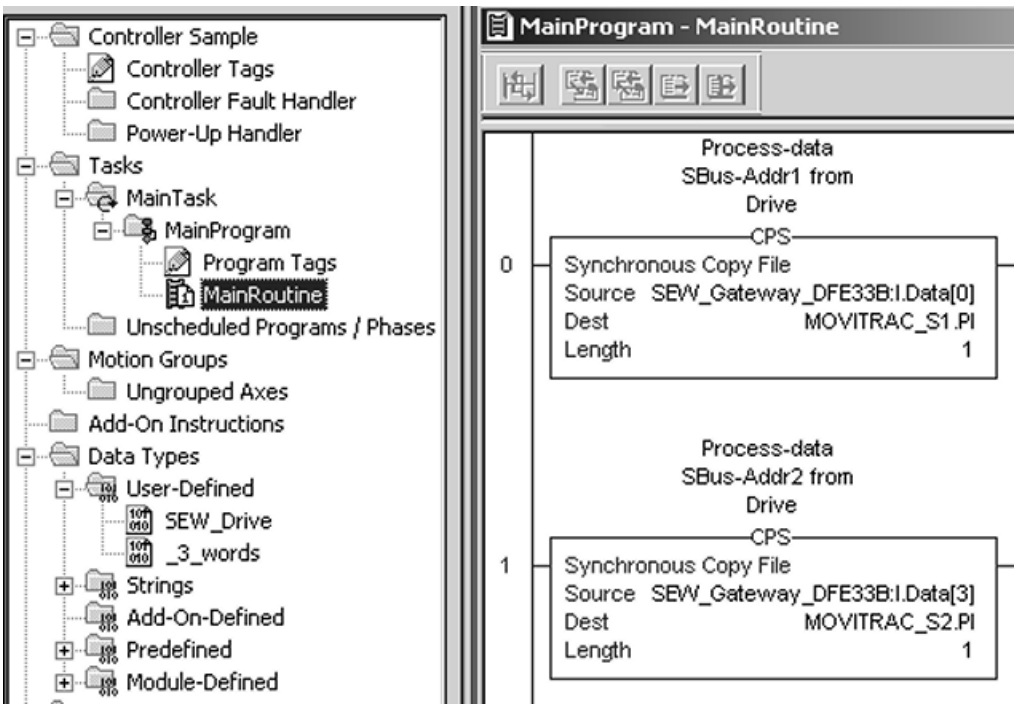
The description for PI and PO data of the controller tag can match the definition of the process data (PD) in MOVITRAC® B (see section 5.4).



Name	Data Type	Style	Description
MOVITRAC_S1	SEW_Drive		Process-data SBus-Addr1
MOVITRAC_S1.PI	_3_words		Process-data SBus-Addr1 from Drive
MOVITRAC_S1.PI.word1	INT	Hex	Status Word 1
MOVITRAC_S1.PI.word2	INT	Hex	Actual Speed
MOVITRAC_S1.PI.word3	INT	Hex	Apparent Output Current
MOVITRAC_S1.PO	_3_words		Process-data SBus-Addr1 to Drive
MOVITRAC_S1.PO.word1	INT	Hex	Control Word 1
MOVITRAC_S1.PO.word2	INT	Hex	Set Speed
MOVITRAC_S1.PO.word3	INT	Hex	No Function
MOVITRAC_S2	SEW_Drive		Process-data SBus-Addr2
MOVITRAC_S2.PI	_3_words		Process-data SBus-Addr2 from Drive
MOVITRAC_S2.PO	_3_words		Process-data SBus-Addr2 to Drive

11790AXX

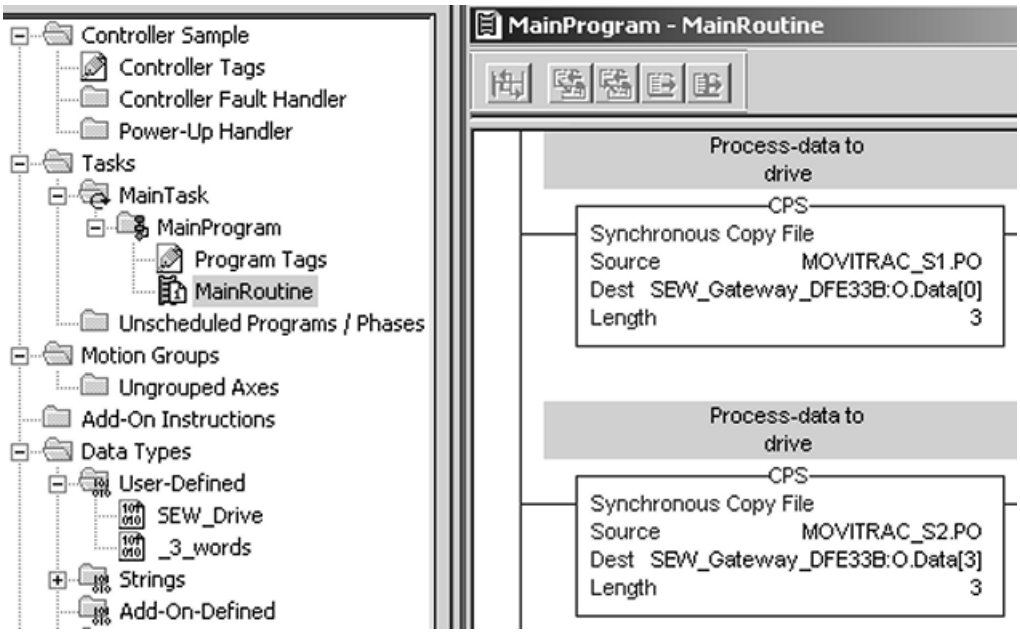
6. To copy the data from the drive to the new data structure, insert CPS commands at the start of the "MainRoutine" (see following figure).



11791AXX

Note that the structure *SEW_Gateway_DFE33B:I.Data* contains the process data of all drives at the gateway. This means the three data words of each drive have to be copied from the structure beginning with a certain offset ([0], [3] to [21]).

To copy the data from the new data structure to the drive, insert CPS commands at the end of the "MainRoutine" (see following figure).

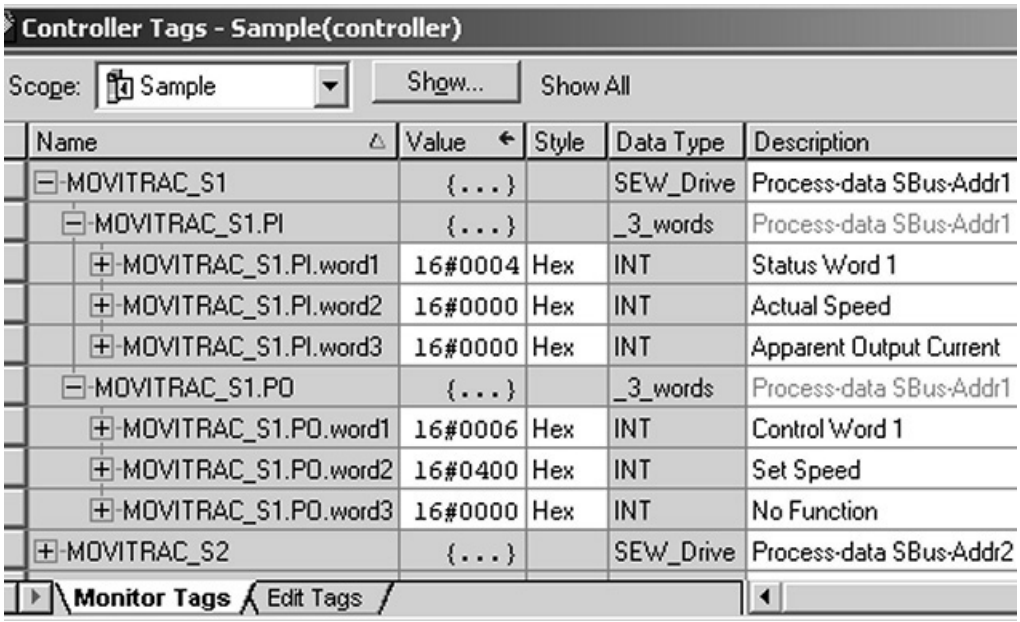


11792AXX

Note that the structure *SEW_Gateway_DFE33B:O.Data* contains the process data to all drives at the gateway. This means the three data words of each drive have to be copied into the structure beginning with a certain offset ([0], [3] to [21]).

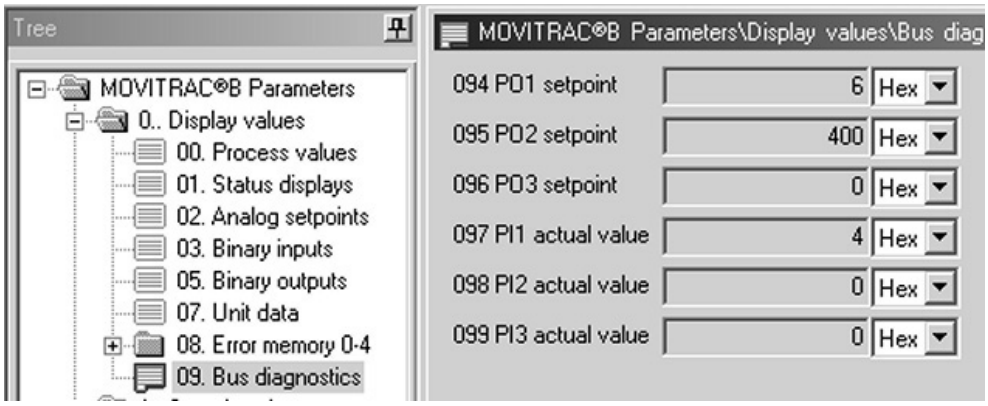
7. Now save the project and transfer it to the PLC. The PLC is set to RUN mode.

   Now actual values from the drives can be read and setpoint values can be written.

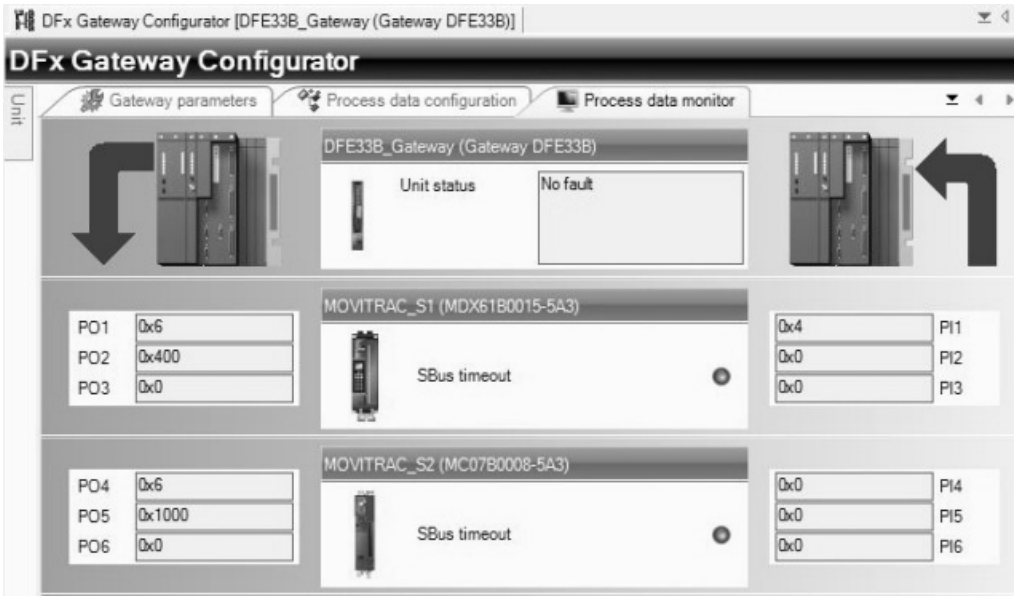


11793AXX

The process data should correspond with the values displayed in the gateway configurator for the DFE33B or in the MOVITOOLS® MotionStudio parameter tree (see following figure).



11762AXX



12080AXX

5.5.3 Access to the unit parameters of MOVIDRIVE® B

Parameter data exchange

You can access the MOVIDRIVE® unit parameters using a register object. The SEW parameter channel is attached to the service telegrams "Get Attribute Single" and "Set Attribute Single".

The SEW parameter channel has the following structure:

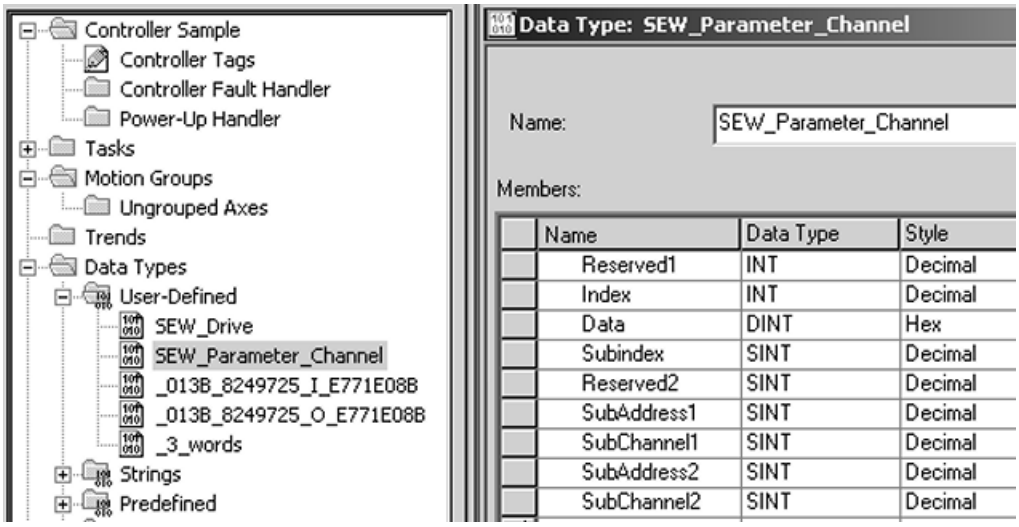
Index	Data	Subindex	Reserved	Sub-address 1	Sub-channel 1	Sub-address 2	Sub-channel 2

In MOVIDRIVE®, a unit parameter can only be addressed using the index and subindex. The subaddress and subchannel are not used. Set these telegram sections as reserved telegram sections to "0".

It is easier to access the data elements of the parameter channel when you create a data type that maps the elements of the parameter channel in a structure (e.g. "SEW_PARAMETER_CHANNEL", see figure below). With the RSLogix5000 program, you can create your own data types in the directory structure (see figure below). To do so, go to the "Controller Organizer" view and choose [Data Types] / [User Defined].

The figure below shows that the index is prefixed with a reserved range of 16 bits. This value is not used. However, it is mandatory because the "Data" element has to be allocated to a 32-bit address.

1. Create a user-defined data structure "SEW_Parameter_Channel" (see figure below).



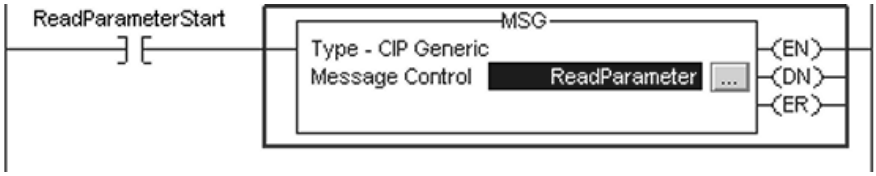
11764AXX

2. Define the following controller tags (see following figure).

Name	Data Type
ReadParameter	MESSAGE
ReadParameterRequest	SEW_Parameter_Channel
ReadParameterResponse	SEW_Parameter_Channel
ReadParameterStart	BOOL

11765AXX

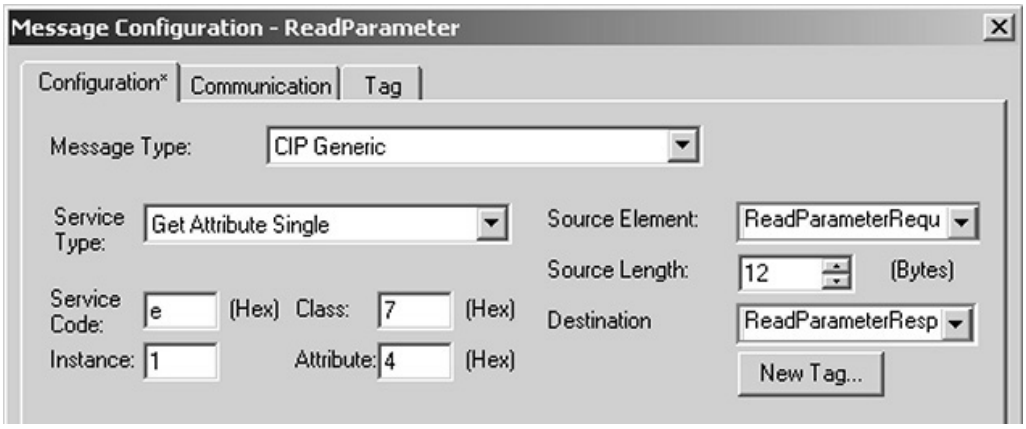
3. Create a rung for executing the "ReadParameter" command (see following figure).



11766AXX

- For the contact, select the "ReadParameterStart" tag
- For message control, select the "ReadParameter" tag

4. Click ... in the MSG command to open the "Message Configuration" window (see following figure).



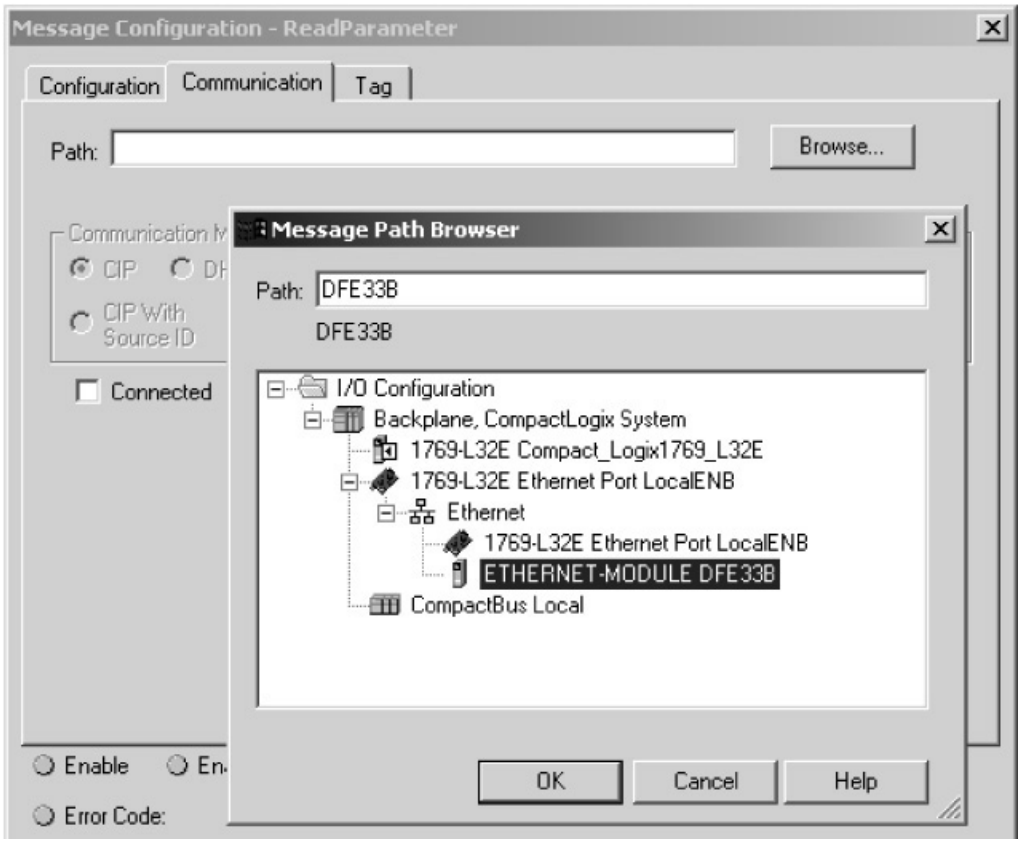
11767AXX

Select "CIP Generic" as the "Message Type". Fill the other fields in the following sequence:

A. Source Element = ReadParameterRequest.Index
B. Source Length = 12
C. Destination = ReadParameterResponse.Index
D. Class = 7_{hex}
E. Instance = 1
F. Attribute = 4_{hex}
G. Service code = e_{hex}

The Service Type is then set automatically.

5. Set the target unit in the "Communication" tab page. Click <Browse>. The "Message Path Browser" window is opened. In the following example, option DFE33B is selected as the recipient.



11714AXX

Do **not** select the "Connected" checkbox, as both the controller and the DFE33B option permit only a limited number of connections.

6. Once the changes have been downloaded to the PLC, the index of the parameter to be read can be entered in *ReadParameterRequest.Index.* Changing the *Read ParameterStart* control bit to "1" executes the read request once (see following figure).

Controller Tags - Sample(controller)

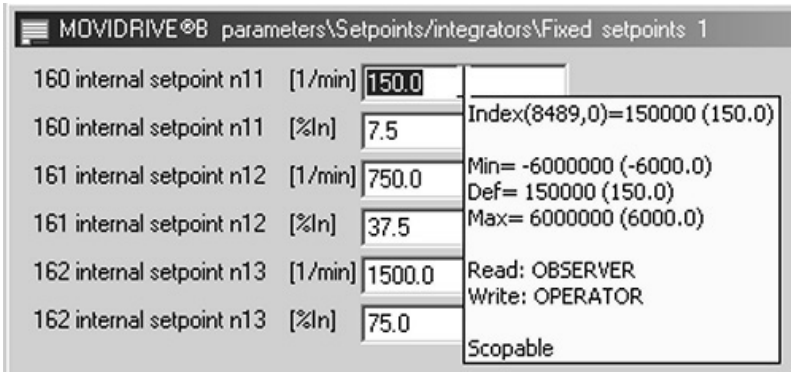
Scope: Sample | Show... | Show All

Name	Value	Style	Data Type
ReadParameter	{...}		MESSAGE
ReadParameterRequest	{...}		SEW_Parameter_Channel
ReadParameterRequest.Reserved1	0	Decimal	INT
ReadParameterRequest.Index	8489	Decimal	INT
ReadParameterRequest.Data	16#0000_0000	Hex	DINT
ReadParameterRequest.Subindex	0	Decimal	SINT
ReadParameterRequest.Reserved2	0	Decimal	SINT
ReadParameterRequest.SubAddress1	0	Decimal	SINT
ReadParameterRequest.SubChannel1	0	Decimal	SINT
ReadParameterRequest.SubAddress2	0	Decimal	SINT
ReadParameterRequest.SubChannel2	0	Decimal	SINT
ReadParameterResponse	{...}		SEW_Parameter_Channel
ReadParameterResponse.Reserved1	0	Decimal	INT
ReadParameterResponse.Index	8489	Decimal	INT
ReadParameterResponse.Data	150000	Decimal	DINT
ReadParameterResponse.Subindex	0	Decimal	SINT
ReadParameterResponse.Reserved2	0	Decimal	SINT
ReadParameterResponse.SubAddre...	0	Decimal	SINT
ReadParameterResponse.SubChann...	0	Decimal	SINT
ReadParameterResponse.SubAddre...	0	Decimal	SINT
ReadParameterResponse.SubChann...	0	Decimal	SINT
ReadParameterStart	1	Decimal	BOOL

11769AXX

Once the read request has been answered, *ReadParameterResponse.Index* should name the index that was read and *ReadParameterResponse.Data* should contain the data that was read. In this example, *P160 fixed setpoint n11* (index 8489) has the value 150 rpm (*Error response* see section "Return codes for parameter setting via explicit messages").

You can check the value in the MOVITOOLS® MotionStudio parameter tree (see following figure). The tooltip displays, for example, the index, subindex, scaling, etc. of a parameter.


MOVIDRIVE®B parameters\Setpoints/integrators\Fixed setpoints 1
160 internal setpoint n11 [1/min] 150.0
160 internal setpoint n11 [%In] 7.5
161 internal setpoint n12 [1/min] 750.0
161 internal setpoint n12 [%In] 37.5
162 internal setpoint n13 [1/min] 1500.0
162 internal setpoint n13 [%In] 75.0
Index(8489,0)=150000 (150.0)
Min= -6000000 (-6000.0)
Def= 150000 (150.0)
Max= 6000000 (6000.0)
Read: OBSERVER
Write: OPERATOR
Scopable

11770AXX

For a complete list of index numbers and conversion factors, refer to the "MOVIDRIVE® Fieldbus Unit Profile" manual.

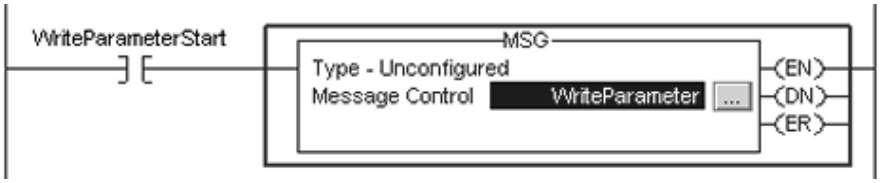
Only a few additions are necessary for activating write access to a parameter.

- Create the controller tags (see following figure).

Name	Data Type
⊞-WriteParameter	MESSAGE
⊞-WriteParameterRequest	SEW_Parameter_Channel
⊞-WriteParameterResponse	SEW_Parameter_Channel
WriteParameterStart	BOOL

11771AXX

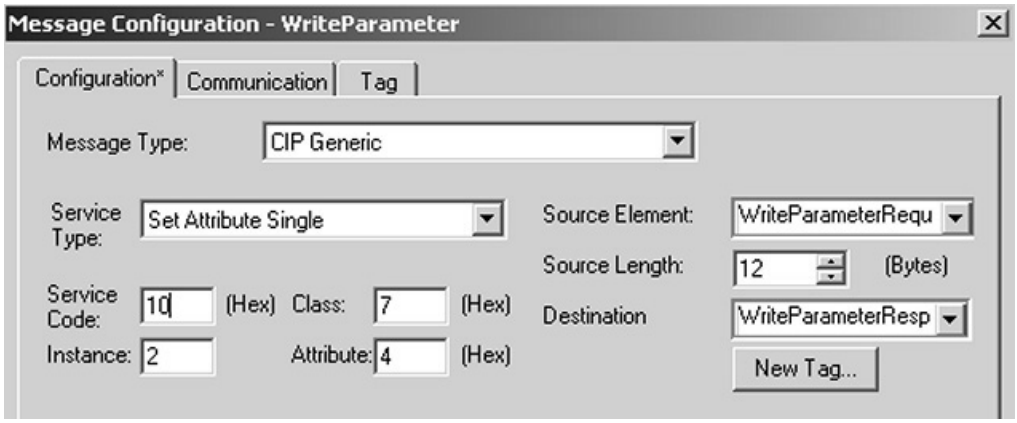
- Create a rung for executing the "WriteParameter" command (see following figure).



11772AXX

For the contact, choose the "WriteParameterStart" tag.
For message control, choose the "WriteParameter" tag.

- Click ... in the MSG command to open the "Message Configuration" window (see following figure).



11773AXX

Select "CIP Generic" as the "Message Type". Fill in the data in the following order:
- Source Element = WriteParameterRequest.Index
- Source Length = 12
- Destination = WriteParameterResponse.Index
- Class = 7_{hex}
- Instance = 2
- Attribute = 4_{hex}
- Service Code = 10_{hex}

- After downloading the changes to the PLC, the index and value to be written into the parameter can be entered in the tags *WriteParameterRequest.Index* and *WriteParameterRequest.Data.* Changing the *WriteParameterStart* control bit to "1" executes the write request once (see following figure).

Controller Tags - Sample(controller)

Scope: Sample | Show... | Show All

Name	Value	Style	Data Type
+-WriteParameter	{...}		MESSAGE
-WriteParameterRequest	{...}		SEW_Parameter_Channel
+-WriteParameterRequest.Reserved1	0	Decimal	INT
+-WriteParameterRequest.Index	8489	Decimal	INT
+-WriteParameterRequest.Data	200000	Decimal	DINT
+-WriteParameterRequest.Subindex	0	Decimal	SINT
+-WriteParameterRequest.Reserved2	0	Decimal	SINT
+-WriteParameterRequest.SubAddress1	0	Decimal	SINT
+-WriteParameterRequest.SubChannel1	0	Decimal	SINT
+-WriteParameterRequest.SubAddress2	0	Decimal	SINT
+-WriteParameterRequest.SubChannel2	0	Decimal	SINT
-WriteParameterResponse	{...}		SEW_Parameter_Channel
+-WriteParameterResponse.Reserved1	0	Decimal	INT
+-WriteParameterResponse.Index	8489	Decimal	INT
+-WriteParameterResponse.Data	200000	Decimal	DINT
+-WriteParameterResponse.Subindex	0	Decimal	SINT
+-WriteParameterResponse.Reserved2	0	Decimal	SINT
+-WriteParameterResponse.SubAddre...	0	Decimal	SINT
+-WriteParameterResponse.SubChann...	0	Decimal	SINT
+-WriteParameterResponse.SubAddre...	0	Decimal	SINT
+-WriteParameterResponse.SubChann...	0	Decimal	SINT
WriteParameterStart	1	Decimal	BOOL

11774AXX

Once the write request has been answered, *WriteParameterResponse.Index* should name the index that was written and *WriteParameterResponse.Data* should contain the data that was written. In this example, the parameter *P160 fixed setpoint n11* (index 8489) has the value 200 rpm (*Error response* see section "Return codes for parameter setting via explicit messages").
You can check the value in the MOVITOOLS® MotionStudio parameter tree. The tooltip of a parameter displays, for example, the index, subindex, scaling, etc. of a parameter.

5.5.4 MOVITRAC® B unit parameter access via DFE33B / UOH11B

The access to MOVITRAC® B unit parameters via EtherNet/IP SBus gateway DFE33B / UOH11B is identical to the access to MOVIDRIVE® B parameter data (see section 5.5.3).

The only difference is that **Read/WriteParameterRequest.SubChannel1** must be set to **2** and **Read/WriteParameterRequest.SubAddress1** must be set to the **SBus address** of the MOVITRAC® B connected to the DFE33B / UOH11B (see following figure).

Controller Tags - Sample(controller)

Scope: Sample | Show... | Show All

Name	Value	Style	Data Type
ReadParameter	{...}		MESSAGE
ReadParameterRequest	{...}		SEW_Parameter_Channel
ReadParameterRequest.Reserved1	0	Decimal	INT
ReadParameterRequest.Index	8489	Decimal	INT
ReadParameterRequest.Data	16#0000_0000	Hex	DINT
ReadParameterRequest.Subindex	0	Decimal	SINT
ReadParameterRequest.Reserved2	0	Decimal	SINT
ReadParameterRequest.SubAddress1	7	Decimal	SINT
ReadParameterRequest.SubChannel1	2	Decimal	SINT
ReadParameterRequest.SubAddress2	0	Decimal	SINT
ReadParameterRequest.SubChannel2	0	Decimal	SINT
ReadParameterResponse	{...}		SEW_Parameter_Channel
ReadParameterResponse.Reserved1	0	Decimal	INT
ReadParameterResponse.Index	8489	Decimal	INT
ReadParameterResponse.Data	150000	Decimal	DINT
ReadParameterResponse.Subindex	0	Decimal	SINT
ReadParameterResponse.Reserved2	0	Decimal	SINT
ReadParameterResponse.SubAddress1	7	Decimal	SINT
ReadParameterResponse.SubChannel1	2	Decimal	SINT
ReadParameterResponse.SubAddress2	0	Decimal	SINT
ReadParameterResponse.SubChannel2	0	Decimal	SINT
ReadParameterStart	1	Decimal	BOOL

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In this example, MOVITRAC® B connected to the DFE33B gateway with SBus address 7 read the value 150 rpm from *P160 fixed setpoint n11* (index 8489).

See the "Appendix" for a schematic representation of the parameter access to lower-level units.

6 Ethernet Industrial Protocol (EtherNet/IP)

6.1 Introduction

The EtherNet Industrial Protocol (EtherNetIP) is an open communication standard based on the classic EtherNet protocols TCP/IP and UDP/IP.

EtherNet/IP has been defined by the **O**pen **D**eviceNet **V**endor **A**ssociation (ODVA) and **C**ontrolNet **I**nternational (CI).

With EtherNet/IP, Ethernet technology has been enhanced to include the CIP (**C**ommon **I**ndustrial **P**rotocol) application protocol. CIP is known in the field of automation engineering because it is used alongside DeviceNet and ControlNet as an application protocol.

6.2 Process data exchange

Depending on how the DFE33B option is used, up to 10 process data words (for operation in MOVIDRIVE® B) or up to 24 process data words (in gateway operation) can be exchanged with an EtherNet/IP master (scanner). The EtherNet/IP master (scanner) sets the process data length when opening the connection.

In addition to a controlling "Exclusive Owner Connection", up to two additional "Listen Only Connections" are possible. This means stand-by controls or visualization devices can also read out the actual values of the drive.

If one controlling connection is already active via Modbus/TCP, an "Exclusive Owner Connection" cannot be activated via EtherNet/IP without a power-on reset.

Timeout behavior

The timeout status is triggered by the DFE33B option. The timeout interval must be set by the EtherNet/IP master (scanner) while establishing the connection. In the EtherNet/IP specification, a "Requested Packet Interval (RPI)" is referred to rather than a timeout interval.

The timeout interval displayed in parameter P819 is calculated by multiplying the Requested Packet Interval (RPI) with the "Timeout Multiplier".

This timeout interval is retained in the device when an "Exclusive Owner Connection" is removed, and the device switches to timeout status after the timeout interval has elapsed. The timeout status is displayed on the front of the DFE33B option by the flashing red "NETWORK STATUS" LED.

The timeout interval must not be altered using MOVITOOLS® or the DBG60B keypad, because it can only be activated via the bus.

The timeout status causes the timeout response set in the inverter to be carried out.

The timeout status can be reset via EtherNet/IP as follows:

- Via reset service of the identity object (class 0x01, instance 0x01, undetermined attribute)
- By establishing the connection again
- With the reset bit in the control word

6.3 CIP object directory

In the Common Industrial Protocol, all unit data can be accessed via objects. The objects listed in the following table are integrated in the DFE33B option.

Class [hex]	Name
01	Identity Object
02	Message Router Object
04	Assembly Object
06	Connection Manager Object
07	Register Object
0F	Parameter Object
64	Vardata Object
F5	TCP/IP Interface Object
F6	EtherNet Link Object

The meaning of the objects and a description of how to access them is given in the following section.

Identity object

- The identity object contains general information on the EtherNet/IP device.
- Class code: 01_{hex}

Class

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Revision	UINT	0001	Revision 1
2	Get	Max Instance	UINT	0001	Maximum instance

Instance 1

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Vendor ID	UINT	013B	SEW-EURODRIVE GmbH & Co KG
2	Get	Device Type	UINT	0065	Manufacturer-specific type
3	Get	Product Code[1)]	UINT	0003 0004	Product no. 3: DFE33B for MOVIDRIVE® B Product no. 4: DFE33B as gateway
4	Get	Revision	STRUCT of		Revision of the identity object, depends on firmware version
		Major Revision	USINT		
		Minor Revision	USINT		
5	Get	Status	WORD		→ Table "Coding of attribute 5 status"
6	Get	Serial Number	UDINT		Unique serial number
7	Get	Product Name[1)]	SHORT_STRING	SEW-MOVIDRIVE-DFE33B SEW-GATEWAY-DFE33B	Product name

1) The values in the identity object depend on whether the DFE33B option is used in MOVIDRIVE® B or as gateway.

- Coding of attribute 5 "Status"

Bit	Name	Description
0	Owned	Controlling connection is active
1	–	Reserved
2	Configured	Configuration complete
3	–	Reserved
4 ... 7	Extended Device Status	→ Table "Coding of the Extended Device Status"
8	Minor Recoverable Fault	Minor fault that can be remedied
9	Minor Unrecoverable Fault	Minor fault that cannot be remedied
10	Major Recoverable Fault	Major fault that can be remedied
11	Major Unrecoverable Fault	Major fault that cannot be remedied
12 ... 15	–	Reserved

- Coding of the "Extended Device Status" (Bit 4 to 7):

Value [binary]	Description
0000	Unknown
0010	At least one faulty IO connection
0011	No IO connection established
0110	At least one IO connection active

Supported services

Service code [hex]	Service name	Class	Instance
01	Get_Attributes_All	X	X
05	Reset	–	X
0E	Get_Attribute_Single	X	X

Message router object

- The message router object provides information on the implemented objects.
- Class code: 02_{hex}

Class

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Revision	UINT	0001	Revision 1

Instance 1

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Object_List	STRUCT of		Object list comprising: • Number of objects • List of objects
		Number	UINT	0009	
		Classes	ARRAY of UINT	01 00 02 00 04 00 06 00 07 00 0F 00 64 00 F5 00 F6 00	
2	Get	Number Available	UINT	0009	Maximum number of connections

Supported services

Service code [hex]	Service name	Class	Instance
01	Get_Attributes_All	X	–
0E	Get_Attribute_Single	X	X

Assembly object

- The assembly object is used to access the DFE33B process data. IO connections can be created for the instances of the assembly object to exchange cyclic process data.
- Class code: 04_{hex}

Class

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Revision	UINT	0002	Revision 2
2	Get	Max Instance	UINT	0082	Maximum instance

Instances for operation as option in MOVIDRIVE® B

Instance 120 - SEW PO data range

This instance is used to access the DFE33B process output data. MOVIDRIVE® can be controlled by only one scanner. Therefore, only one connection can be established with this instance.

Attribute	Access	Name	Data type	Default value [hex]	Description
3	Get	Data	Array of BYTE	–	OUTPUT assembly

Instance 121 - "Heartbeat"

This instance is accessed when the scanner wants to establish an input only connection. No process output data is sent with this type of connection. It is used only to read process input data.

Attribute	Access	Name	Data type	Default value [hex]	Description
3	Get	Data	Array of BYTE	–	OUTPUT assembly Data size = 0

Instance 130 - SEW PI data range

This instance is used to access the DFE33B process input data. Several multicast connections or a point-to-point connection can be established with this instance.

Attribute	Access	Name	Data type	Default value [hex]	Description
3	Get	Data	Array of BYTE	–	INPUT assembly

Instances for operation as gateway

Instance 122 - SEW PO data range

This instance is used to access the DFE33B process output data. It can be controlled by only one scanner. Therefore, only one connection can be established with this instance.

Attribute	Access	Name	Data type	Default value [hex]	Description
3	Get	Data	Array of BYTE	–	OUTPUT assembly

Instance 121 - "Heartbeat"

This instance is accessed when the scanner wants to establish an input only connection. No process output data is sent with this type of connection. It is used only to read process input data.

Attribute	Access	Name	Data type	Default value [hex]	Description
3	Get	Data	Array of BYTE	–	OUTPUT assembly Data size = 0

Instance 132 - SEW PI data range

This instance is used to access the DFE33B process input data. Several multicast connections or a point-to-point connection can be established with this instance.

Attribute	Access	Name	Data type	Default value [hex]	Description
3	Get	Data	Array of BYTE	–	INPUT assembly

TIP

The designations "INPUT assembly" and "OUTPUT assembly" refer to the processes as seen from the network's point of view. "INPUT assembly" produces data on the network, "OUTPUT assembly" consumes data from the network.

Supported services

Service code [hex]	Service name	Class	Instance 120 Instance 122	Instance 121	Instance 130 Instance 132
0E	Get_Attribute_Single	X	X	–	X

Register object

- The register object is used to access an SEW parameter index.
- Class code: 07_{hex}

	TIPS
	For parameter access using the register object, you must wait for a response before sending the next request to the DFE33B. Otherwise, the DFE33B generates an *Error response* with the *General Error Code 0x1E.* However, depending on the unit, a timeout may also occur.

Class

Attribute	Access	Name	Data type	Default value [hex]	Description
2	Get	Max Instance	UINT	0009	Maximum instance

The MOVILINK® parameter services are mapped in the nine instances of the register object. The services "Get_Attribute_Single" and "Set_Attribute_Single" are used for access.

As the register object is designed so that INPUT objects can only be read and OUTPUT objects can be read and written, the options listed in the following table are available for addressing the parameter channel.

Instance	INPUT / OUTPUT	Resulting MOVILINK® service with	
		Get_Attribute_Single	Set_Attribute_Single
1	INPUT	READ parameters	Invalid
2	OUTPUT	READ	WRITE parameters
3	OUTPUT	READ	WRITE VOLATILE parameters
4	INPUT	READ MINIMUM	Invalid
5	INPUT	READ MAXIMUM	Invalid
6	INPUT	READ DEFAULT	Invalid
7	INPUT	READ SCALING	Invalid
8	INPUT	READ ATTRIBUTE	Invalid
9	INPUT	READ EEPROM	Invalid

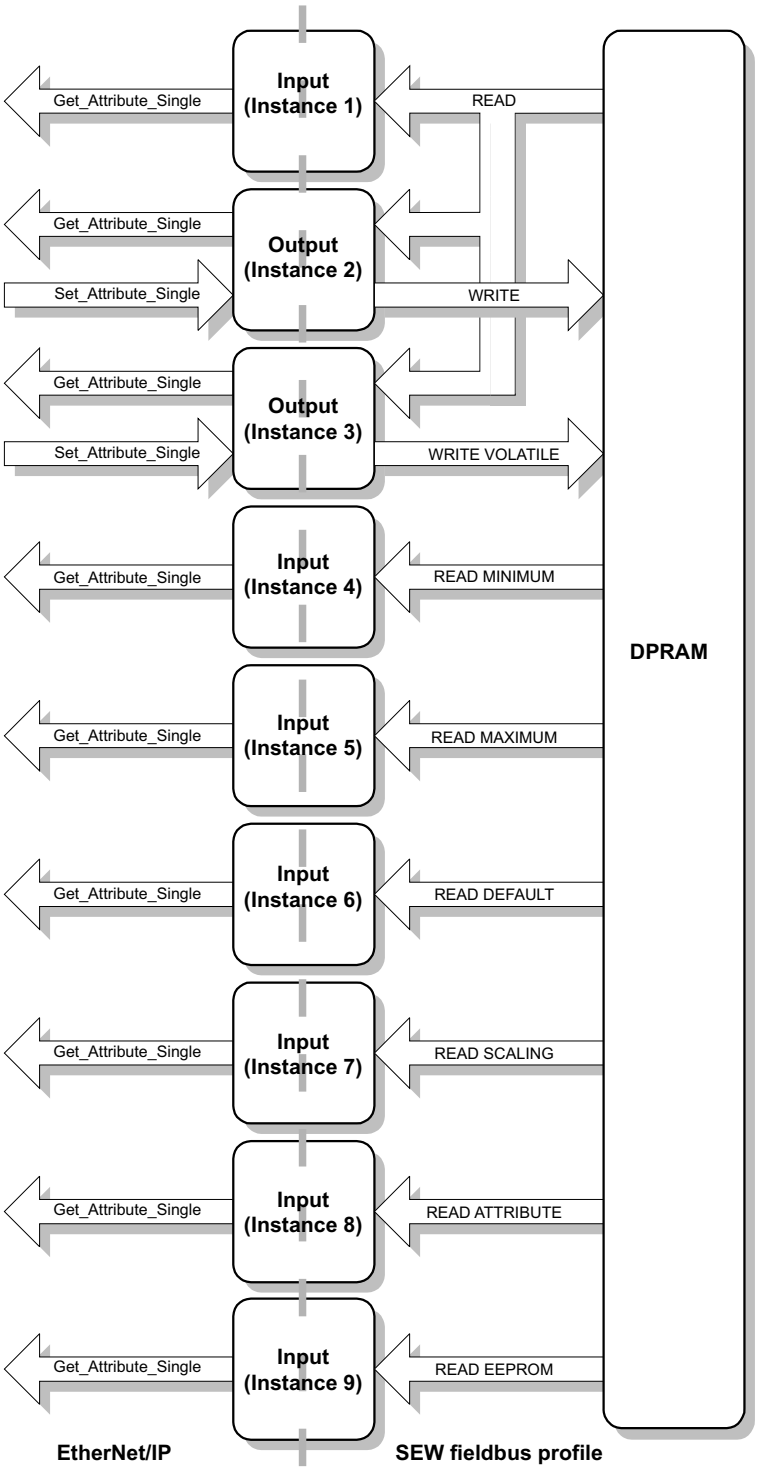

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Fig. 2: Description of the parameter channel

Instance 1 to 9

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Bad Flag	BOOL	00	0 = good / 1 = bad
2	Get	Direction	BOOL	00 01	Input register Output register
3	Get	Size	UINT	0060	Data length in bits (96 bits = 12 bytes)
4	Get/Set	Data	ARRAY of BITS		Data in format of the SEW parameter channel

TIPS

Explanation of the attributes:

- Attribute 1 indicates whether an error occurred during the previous access to the data field.
- Attribute 2 shows the direction of the instance.
- Attribute 3 indicates the data length in bits.
- Attribute 4 represents the parameter data. When accessing attribute 4, the SEW parameter channel must be attached to the service telegram. The SEW parameter channel consists of the elements listed in the following table.

Name	Data type	Description		
Index	UINT	SEW parameter index		
Data	UDINT	Data (32 bit)		
Subindex	BYTE	SEW unit subindex		
Reserved	BYTE	Reserved (must be "0")		
Subaddress 1	BYTE	0 Parameter of MOVIDRIVE® B or gateway itself	1 – 63	SBus address of units connected to the SBus of the gateway[1)]
Subchannel 1	BYTE	0	2	SBus (subchannel of the gateway[1)])
Subaddress 2	BYTE	Reserved (must be "0")		
Subchannel 2	BYTE	Reserved (must be "0")		

1) See the "Appendix" for a schematic representation of the parameter access to lower-level units.

Supported services

Service code [hex]	Service name	Class	Instance
0E	Get_Attribute_Single	X	X
10	Set_Attribute_Single	–	X

Parameter object

- In exceptional cases, you can also use the parameter object to access an SEW parameter channel.
- Class code: $0F_{hex}$

Class

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Revision	UINT	0001	Revision 1
2	Get	Max Instance	UINT	0005	Maximum instance
8	Get	Parameter Class Descriptor	UINT	0009	Bit 0: Supports parameter instances Bit 3: Parameters are saved permanently
9	Get	Configura-tion Assembly Interface	UINT	0000	Configuration assembly is not supported.

The instances of the parameter object should only be used to access SEW parameters when the EtherNet/IP scanner in use does not support the process of attaching own data to the services "Get_Attribute_Single" and "Set_Attribute_Single".

When you use the parameter object, it takes a number of steps to address a parameter index.

- First, the address of the required parameter is set in instances 1 to 4.
- Next, instance 5 is used to access the parameter that is addressed in instances 1 to 4.

Access to an SEW parameter index via the parameter object is complicated and prone to errors. Consequently, this process should only be used when the EtherNet/IP scanner does not support configuration using the mechanisms of the register object.

Instance 1 - SEW parameter index

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Set	Parameter Value	UINT	207A	Index of the parameter
2	Get	Link Path Size	USINT	00	No link is specified
3	Get	Link Path	Packed EPATH	00	Not used here
4	Get	Descriptor	WORD	0000	Read/write parameter
5	Get	Data Type	EPATH	00C7	UINT
6	Get	Data Size	USINT	02	Data length in bytes

Instance 2 - SEW subindex

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Set	Parameter Value	UINT	0000	Low byte contains the subindex
2	Get	Link Path Size	USINT	00	No link is specified
3	Get	Link Path	Packed EPATH	00	Not used here
4	Get	Descriptor	WORD	0000	Read/write parameter
5	Get	Data Type	EPATH	00C7	UINT
6	Get	Data Size	USINT	02	Data length in bytes

Instance 3 - SEW subparameter 1

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Set	Parameter Value	UINT	0000	Low byte contains subaddress 1 High byte contains subchannel 1
2	Get	Link Path Size	USINT	00	No link is specified
3	Get	Link Path	Packed EPATH	00	Not used here
4	Get	Descriptor	WORD	0000	Read/write parameter
5	Get	Data Type	EPATH	00C7	UINT
6	Get	Data Size	USINT	02	Data length in bytes

Instance 4 - SEW subparameter 2

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Set	Parameter Value	UINT	0000	Low byte contains subaddress 2 High byte contains subchannel 2
2	Get	Link Path Size	USINT	00	No link is specified
3	Get	Link Path	Packed EPATH	00	Not used here
4	Get	Descriptor	WORD	0000	Read/write parameter
5	Get	Data Type	EPATH	00C7	UINT
6	Get	Data Size	USINT	02	Data length in bytes

Instance 5 - SEW read/write

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Set	Parameter Value	UDINT		The set service executes write access to the parameters addressed in instances 1 to 4. The get service executes read access to the parameters addressed in instances 1 to 4.
2	Get	Link Path Size	USINT	00	No link is specified
3	Get	Link Path	Packed EPATH	00	Not used here
4	Get	Descriptor	WORD	0000	Read/write parameter
5	Get	Data Type	EPATH	00C8	UDINT
6	Get	Data Size	USINT	04	Data length in bytes

Supported services

Service code [hex]	Service name	Class	Instance
0E	Get_Attribute_Single	X	X
10	Set_Attribute_Single	–	X

Vardata object

- This manufacturer-specific object is required to use the engineering option of some of the software tools provided by SEW-EURODRIVE.
- Class code: 64_{hex}

Class

None of the class attributes are supported.

Instance 1

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Data	ARRAY OF SINT	–	–
2	Get	Size	UINT	00F2	Maximum data length in bytes

Supported services

Service code [hex]	Service name	Instance attribute 1	Instance attribute 2
0E	Get_Attribute_Single	X	X
32	Vardata (custom)	X	–

The standardized service "Get_Attribute_Single" (service code 0x0E) returns a data stream with the maximum data length (attribute 2) when instance attribute 1 is accessed. The data content is filled with zeros. If a data stream is added to the request telegram (Service Type Custom), this data is returned in a mirrored form (Vardata test mode).

The Vardata service (service code 0x32) is a manufacturer-specific service. With this service, the telegram structure for the request and response is the same. The telegram contains routing information, the data length of the Vardata user data telegram and the actual Vardata layer 7 telegram. The data length of the Vardata layer 7 telegram is variable.

The following table shows the complete telegram structure.

Name	Data type
Subaddress 1	BYTE
Subchannel 1	BYTE
Subaddress 2	BYTE
Subchannel 2	BYTE
Data Len Low	BYTE
Data Len High	BYTE
Reserved	BYTE
Reserved	BYTE
FC	BYTE
Vardata	Array of BYTE

TCP/IP interface object

- The TCP/IP interface object enables the IP parameters to be configured via EtherNet/IP.
- Class code: $F5_{hex}$

Class

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Revision	UINT	0001	Revision 1
2	Get	Max Instance	UINT	0001	Maximum instance
3	Get	Number of Instances	UINT	0001	DFE33B has one TCP/IP interface

Instance 1

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Status	DWORD	00000001	Valid configuration
2	Get	Configuration Capability	DWORD	00000014	The interface configuration attribute (5) is writeable. The DHCP can be used for configuration.
3	Set	Configuration Control	DWORD	00000002	0 = The unit uses the stored IP parameters at startup. 2 = The unit waits for its IP configuration via DHCP at startup.
4	Get	Physical Link Object	STRUCT of		Reference to the EtherNet link object (class code 0xF6) as sublayer.
		Path Size	UINT	0002	
		Path	Padded EPATH	20 F6 24 01	
5	Set	Interface Configuration	STRUCT of		
		IP Address	UDINT		Current IP address
		Network Mask	UDINT		Current subnetwork mask
		Gateway Address	UDINT		Current standard gateway
		Name Server	UDINT	00000000	DNS is not supported
		Name Server 2	UDINT	00000000	DNS is not supported
		Domain Name	STRING	sew.de	
6	Get	Host Name	STRING		Not used here

Supported services

Service code [hex]	Service name	Class	Instance
01	Get_Attributes_All	X	_
0E	Get_Attribute_Single	X	X
10	Set_Attribute_Single	–	X

Ethernet link object

- Information on the Ethernet communication interface is stored in the Ethernet link object.
- Class code: $F6_{hex}$

Class

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Revision	UINT	0002	Revision 2
2	Get	Max Instance	UINT	0001	Maximum instance
3	Get	Number of Instances	UINT	0001	DFE33B has one TCP/IP interface

Instance 1 – Ethernet connection X30

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Interface Speed	UDINT	00000064	Default value = 100 → transmission speed in MBit/s
2	Get	Interface Flags	DWORD		• Bit 0 displays the active link • Bit 1 displays full duplex mode • Bit 2 to bit 4 signal negotiation status • Bit 5 shows whether the manual setting has to be reset • Bit 6 indicates a local hardware fault
3	Get	Physical Address	ARRAY of 6 USINTs	00 0F 69 xx xx xx	MAC ID SEW MAC OUI: 00 0F 69

Instance 2 – Ethernet connection X32

Attribute	Access	Name	Data type	Default value [hex]	Description
1	Get	Interface Speed	UDINT	00000064	Default value = 100 → transmission speed in MBit/s
2	Get	Interface Flags	DWORD		• Bit 0 displays the active link • Bit 1 displays full duplex mode • Bit 2 to bit 4 signal negotiation status • Bit 5 shows whether the manual setting has to be reset • Bit 6 indicates a local hardware fault
3	Get	Physical Address	ARRAY of 6 USINTs	00 0F 69 xx xx xx xx	MAC ID SEW MAC OUI: 00 0F 69

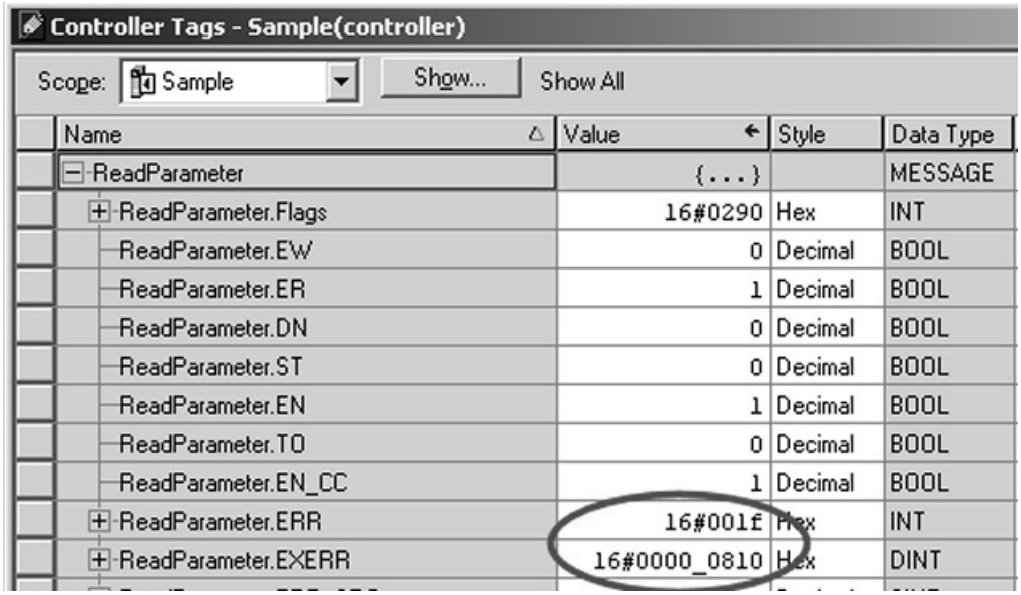
Supported services

Service code [hex]	Service name	Class	Instance
01	Get_Attributes_All	X	_
0E	Get_Attribute_Single	X	X

6.4 Return codes for parameter setting via explicit messages

If a parameter request via explicit messages fails, a fault code can be used to determine the cause. An error can be generated either by the DFE33B option, by the EtherNet/IP system, or by a timeout.

The general error code (ERR) and the additional code (EXERR) can be read out from the status registers of the message tags (see following figure).



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SEW-specific return codes

The return codes that are returned by the DFE33B option or the inverter in the event of incorrectly set parameters are described in the section "MOVILINK®-specific return codes". In conjunction with EtherNet/IP, the return codes are returned in the following format. The following table shows the data format for a parameter response telegram.

	Byte offset			
	0	**1**	**2**	**3**
Function	General error code	Additional code length (words)	Additional code word 1 (low byte)	Additional code word 1 (high byte)
Example	$1F_{hex}$ Vendor specific	01_{hex} only low word (word 1)	10_{hex} MOVILINK® additional error code	08_{hex} MOVILINK® error class

In the example above, the high byte of the additional code includes MOVILINK® error class 08 (general error). MOVILINK® additional error code 10 (invalid index) is located in the additional code low byte. This information shows that the system tried to access a unit index that does not exist.

Return codes of EtherNet/IP

EtherNet/IP-specific return codes are issued in the error telegram if the data format is not complied with during the transfer or if a service is performed that has not been implemented. The coding of these return codes is described in the EtherNet/IP specification (also see section "General error codes").

Timeout of explicit messages

The timeout is triggered by the DFE33B option. The timeout interval must be set by the master after the connection has been established. The EtherNet/IP specification refers to an "expected packet rate" rather than a timeout interval in this case. The expected packet rate is calculated from the timeout interval as follows:

$t_{Timeout\_ExplicitMessages} = 4 \times t_{Expected\_Packet\_Rate\_ExplicitMessages}$

It can be set using connection object class 5, instance 1, attribute 9. The range of values runs from 0 ms to 655535 ms in 5 ms steps.

If a timeout is triggered for the explicit messages, this connection type for the explicit messages is disconnected automatically. This is the default setting for EtherNet/IP. The connection for these explicit messages must be re-established to communicate with these messages again. The timeout is **not** forwarded to the inverter.

General error code

General error code (hex)	Error name	Description
00	Success	Successful
01	Connection failure	A connection-specific service has failed.
02	Resource unavailable	The source required for performing the service is unavailable.
03		Reserved
04	Path segment error	The processing node cannot interpret the "path segment identifier" or the segment syntax.
05	Path destination unknown	The "path" refers to an object class, object instance, or a structure element that is not supported by the processing node.
06-07		Reserved
08	Service not supported	The service is not supported for the selected class/instance.
09	Invalid attribute value	Invalid attribute data have been sent.
0A-0B		
0C	Object state conflict	The selected object cannot perform the service in its current status.
0D		Reserved
0E	Attribute not settable	The selected object can be accessed with write access.
10	Device state conflict	The current status of the device makes it impossible to perform the required service.
11-12		Reserved
13	Not enough data	The length of the transferred data is too short for the service to be performed.
14	Attribute not supported	The selected attribute is not supported.
15	Too much data	The length of the transferred data is too long for the service to be performed.
16	Object does not exist	The selected object is not implemented in the device.
17-1D		Reserved
1E	Embedded service error	Error during internal processing of unit.
1F	Vendor specific error	Manufacturer-specific error (see "Fieldbus Unit Profile" manual)
20	Invalid parameter	Invalid parameter. This error message is used when a parameter does not meet the requirements of the specification and/or the requirements of the application
21-FF		Reserved

MOVILINK®-specific return codes

The following table lists the MOVILINK®-specific return codes (MOVILINK® "Error Class" and "Additional Code") in the event of incorrectly set parameters.

MOVILINK®		
Error class	**Additional code**	**Description**
0x05	0x00	Unknown error
	0x01	Illegal service
	0x02	No response
	0x03	Different address
	0x04	Different type
	0x05	Different index
	0x06	Different service
	0x07	Different channel
	0x08	Different block
	0x09	No scope data
	0x0A	Illegal length
	0x0B	Illegal address
	0x0C	Illegal pointer
	0x0D	Not enough memory
	0x0E	System error
	0x0F	Communication does not exist
	0x10	Communication not initialized
	0x11	Mouse conflict
	0x12	Illegal bus
	0x13	FCS error
	0x14	PB init
	0x15	SBUS – illegal fragment count
	0x16	SBUS – illegal fragment type
	0x17	Access denied
		Not used

MOVILINK®		
Error class	**Additional code**	**Description**
0x08	0x00	No error
	0x10	Illegal index
	0x11	Not yet implemented
	0x12	Read only
	0x13	Parameter blocking
	0x14	Setup runs
	0x15	Value too large
	0x16	Value too small
	0x17	Required hardware does not exist
	0x18	Internal error
	0x19	Access only via RS485 (via X13)
	0x1A	Access only via RS485 (via XT)
	0x1B	Parameter protected
	0x1C	"Controller inhibit" required
	0x1D	Value invalid
	0x1E	Setup started
	0x1F	Buffer overflow
	0x20	"No enable" required
	0x21	End of file
	0x22	Communication order
	0x23	"IPOS stop" required
	0x24	Autosetup
	0x25	Encoder nameplate error
	0x29	PLC state error

7 Project Planning and Startup (Modbus/TCP)

This section provides information on project planning for the Modbus/TCP master and startup of the inverter for fieldbus operation. Prerequisite is the correct connection and setting of the IP address parameters of the DFE33B in accordance with the section "Assembly and Installation Instructions".

7.1 Unit description file for Modbus/TCP

	TIP
	No unit description files have been specified for Modbus/TCP.

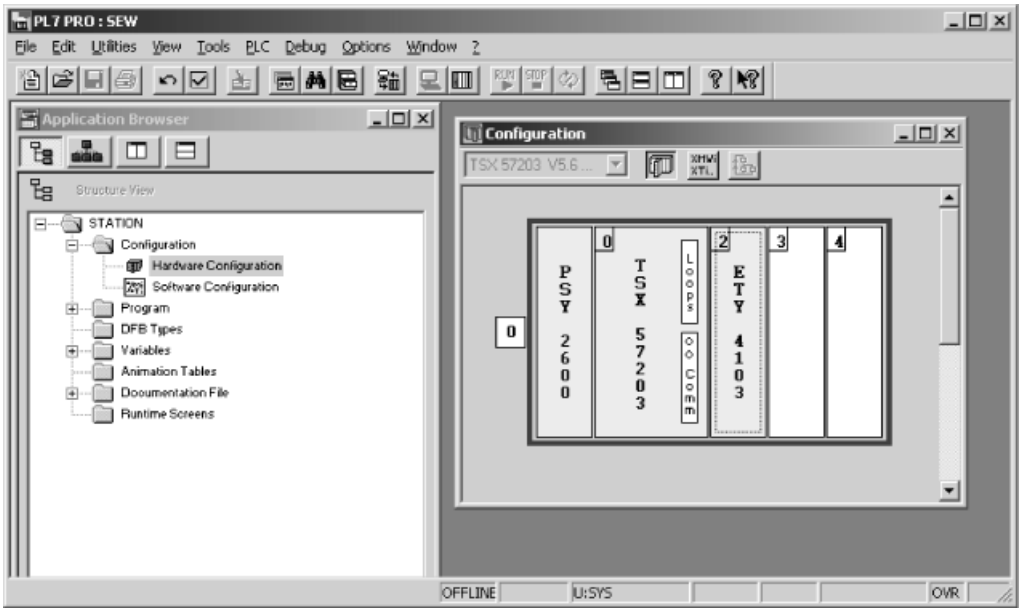
7.2 Configuring the master (Modbus scanner)

The first example refers to the configuration and programming of a Schneider Electric control system TSX Premium P57203 using the programming software PL7 PRO. An ETY4103 is used as the Ethernet component. The information and figures are based on the English version of the PL7 PRO software.

	TIP
	• Enter values in PL7 PRO using the keypad. • As the Ethernet, use bus master components from Schneider Electric that support IO scanning. The Modbus/TCP interface module for SEW drives cannot be addressed via "Peer Cop". However, Ethernet bus masters that only support "Peer Cop" can access the drives from the PLC program using read and write commands.

Hardware configuration

- Start PL7 PRO and enter the control type.
- Enter the hardware configuration for the control system in the application browser under STATION / Configuration / Hardware Configuration.



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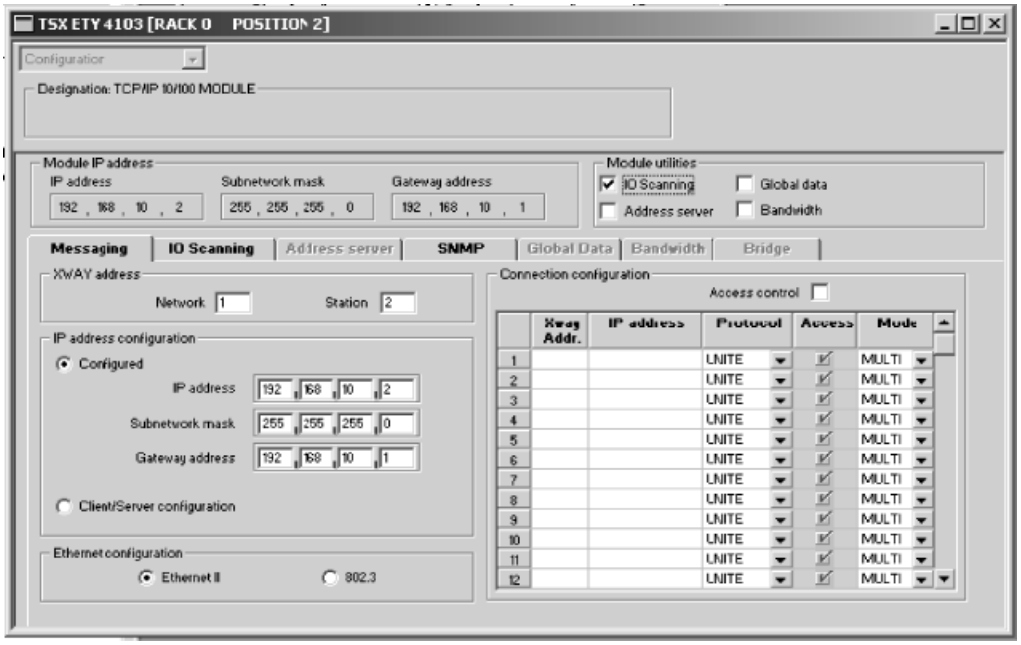
Settings for the Ethernet component

- Double-click on the Ethernet component to open the configuration window.
- If you have a non-extendable rack, enter a "1" in the "Network" input field in the

"XWAY address" section.

- Enter the number of the slot that the Ethernet component is plugged into (here: 2) in the input field "Station" in the "XWAY address" section. In this case, the XWAY address is 1.2.
- In the section "IP address configuration" select the checkbox "Configured". Enter the IP address and the network parameters in the input fields "IP address", "Subnetwork mask" and "Gateway address". If the control system is to receive the address parameters via a DHCP server, select the checkbox "Client/Server configuration" in the section "IP address configuration".
- In the "Ethernet configuration" section, select the checkbox "Ethernet II".
- In the "Module utilities" section, select the checkbox "IO Scanning".



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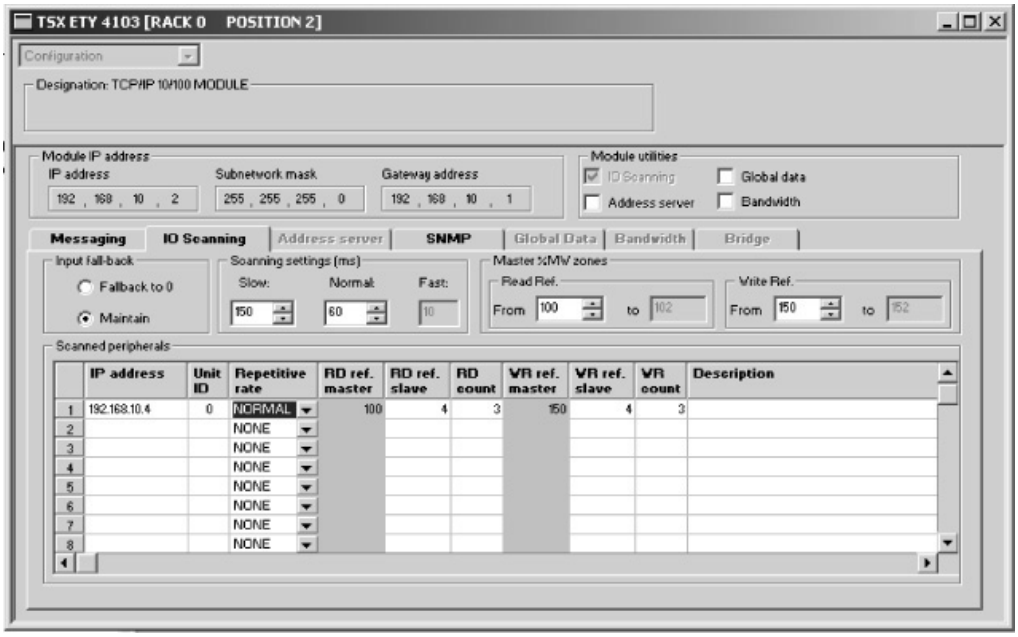
7.2.1 Configuring the DFE33B as option in MOVIDRIVE® MDX61B

Addressing the drive using IO scanning

- Select the "IO Scanning" tab page. On this tab page, you specify which of the stations connected to the Modbus are to exchange cyclic data.
- In the section "Master %MW zones" enter the control memory areas that are to be used to exchange cyclic data with the Modbus stations. You will use the memory addresses later in your PLC program.
- Enter the following in the "Scanned peripherals" section:
  - In the "IP address" input field, enter the IP address of the SEW drive.
  - In the "Unit ID" input field, enter the value "0".
  - In the "Repetitive rate" dropdown menu, enter the cycle time that is used to address the stations.
  - In the "RD ref. slave" and "WR ref. slave" input fields, enter the value "4" as the cyclic process data is located after offset 4.
  - In the "RD count" and "WR count" input fields, enter the number of words to be exchanged. The values must be the same in both fields. For the DFE33B option, you can enter between 1 and 10 words.



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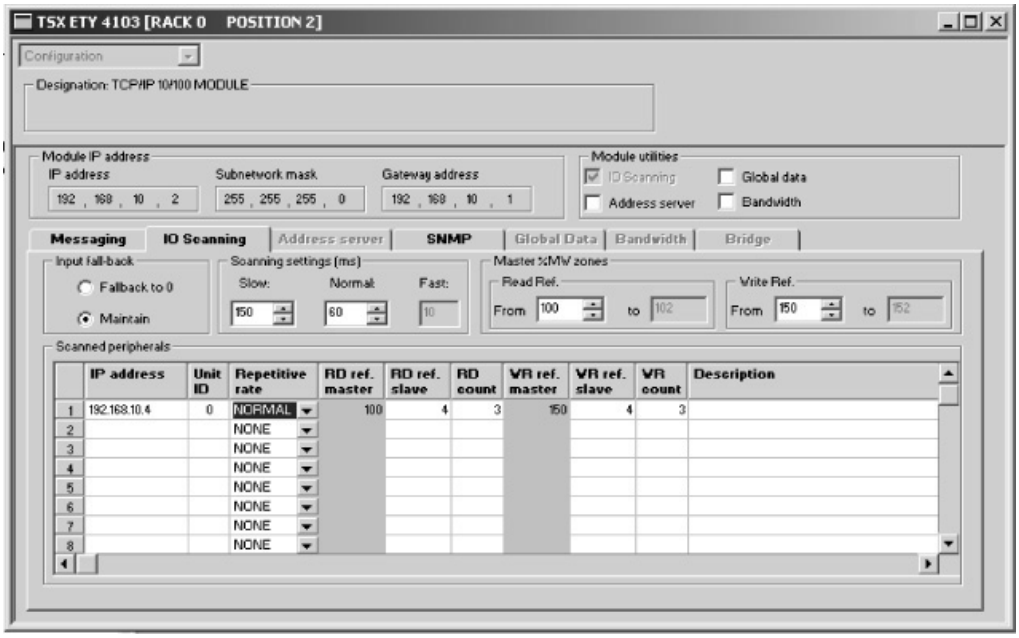
- Click the button "Confirm√" to confirm rack configuration and global configuration.
- Once you have transferred your settings and started the program, the color of the DFE33B "NETWORK/STATUS" LEDs changes to green (see section "Status LED of the DFE33B option").

7.2.2 Configuring the DFE33B as option in MOVITRAC® B or in the UOH11B gateway housing

Addressing the drive using IO scanning

- Select the "IO Scanning" tab page. On this tab page, you specify which of the stations connected to the Modbus are to exchange cyclic data.
- In the section "Master %MW zones" enter the control memory areas that are to be used to exchange cyclic data with the Modbus stations. You will use the memory addresses later in your PLC program.
- Enter the following in the "Scanned peripherals" section:
  - In the "IP address" input field, enter the IP address of the SEW drive.
  - In the "Unit ID" input field, enter the value "0".
  - In the "Repetitive rate" dropdown menu, enter the cycle time that is used to address the stations.
  - In the "RD ref. slave" and "WR ref. slave" input fields, enter the value "4" as the cyclic process data is located after offset 4.
  - In the "RD count" and "WR count" input fields, enter the number of words to be exchanged. The values must be the same in both fields. For the DFE33B option you can enter between 3 and 24 words (in steps of 3) in gateway operation.



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- Click the button "Confirm√" to confirm rack configuration and global configuration.
- Once you have transferred your settings and started the program, the color of the DFE33B "NETWORK/STATUS" LEDs changes to green (see section "Status LED of the DFE33B option").

7.2.3 Auto Setup for gateway operation

The Auto Setup function enables startup of the DFE33B as gateway to be performed without a PC. Activate the function via the Auto Setup DIP switch (see section 4.4 on page 18).

	TIP
	Switching on the Auto Setup (AS) DIP switch causes the function to be executed once. **The Auto Setup DIP switch must then remain in the ON position.** The function can be performed again by switching the DIP switch off and back on again.

As a first step, the DFE33B searches for inverters on the lower-level SBus. This process is indicated by the LED **H1** (system error) flashing briefly. For this purpose, different SBus addresses must be set for the inverters (P881). We recommend assigning the addresses beginning with address 1 in ascending order based on the arrangement of inverters in the control cabinet. The process image on the fieldbus side is expanded by three words for each detected inverter.

LED **H1** remains lit if no inverter was located. A total of up to eight inverters is taken into account.

After the search is completed, the DFE33B periodically exchanges three process data words with each connected inverter. The process output data is taken from the fieldbus, divided into blocks of three and transmitted. The inverters read the process input data, put it together and send it to the fieldbus master.

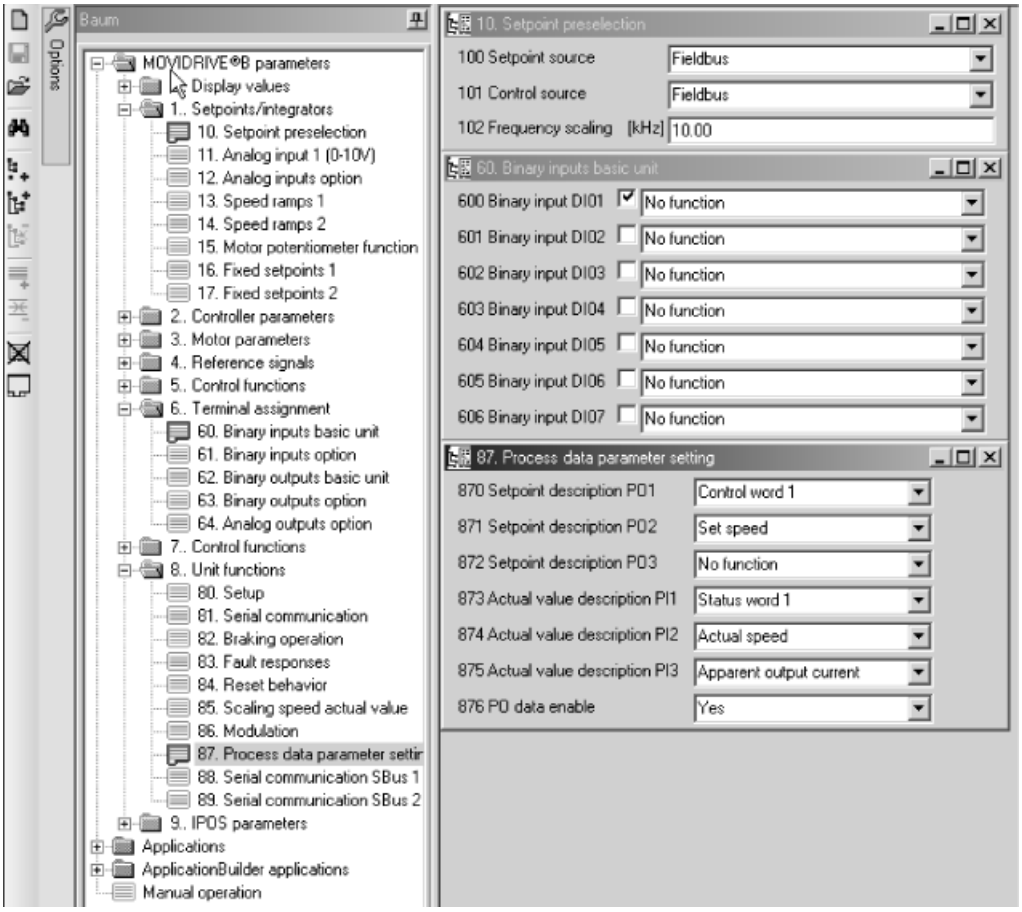
The cycle time of the SBus communication is 2 ms per station at a baud rate of 500 kBit/s without any additional engineering activities.

For an application with 8 inverters on the SBus, the cycle time of the process data update is then 8 x 2 ms = 16 ms.

	TIP
	If you change the process data assignment of the inverters connected to the DFE33B, you have to activate Auto Setup again because the DFE33B saves these values only once during Auto Setup. At the same time, the process data assignments of the connected inverters may not be changed dynamically after Auto Setup.

7.3 Setting the MOVIDRIVE® MDX61B inverter

The following settings must be made for simple fieldbus operation.



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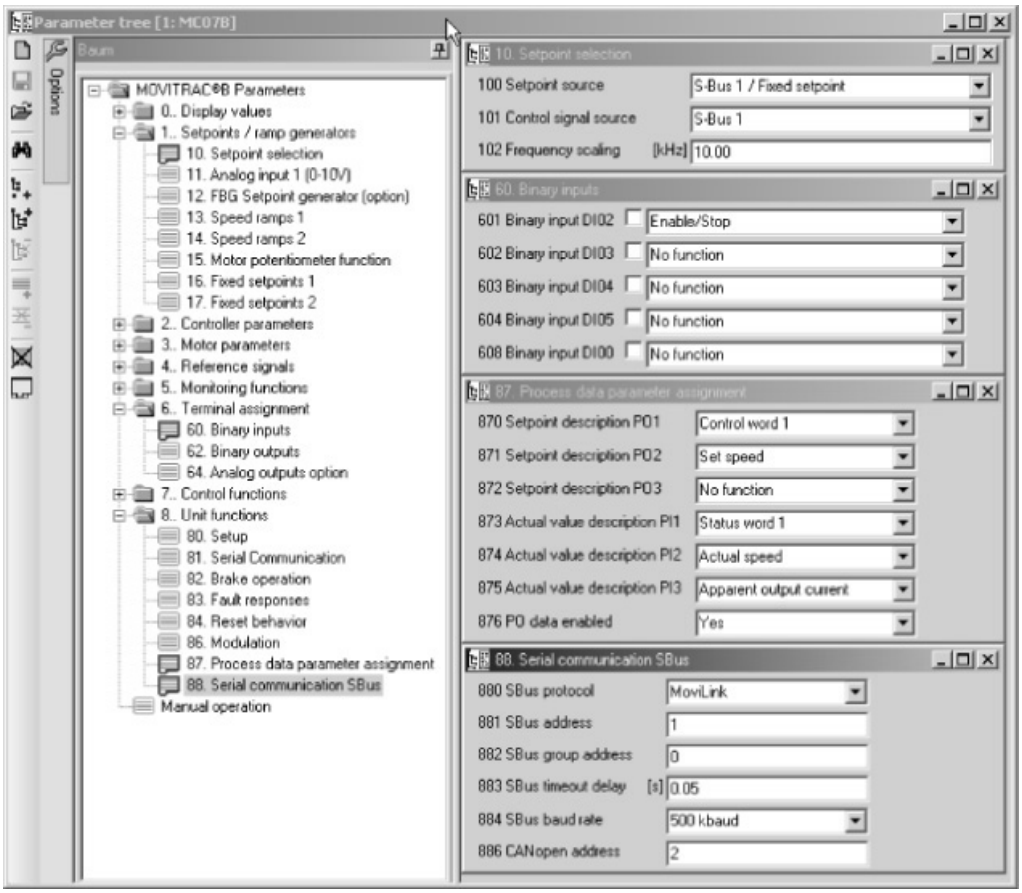
However, to control the MOVIDRIVE® B inverter via Modbus/TCP, you must first switch the inverter to control signal source (P101) and setpoint source (P100) = FIELDBUS. The FIELDBUS setting means the inverter parameters are set for control and setpoint entry via Modbus/TCP. The MOVIDRIVE® B inverter then responds to the process output data transmitted by the master programmable controller.

The parameters of the MOVIDRIVE® B inverter can be set immediately via Modbus/TCP without any further settings once the Modbus/TCP option card has been installed. For example, all parameters can be set by the master programmable controller after being switched-on.

Activation of the control signal source and setpoint source FIELDBUS is signaled to the higher-level controller using the "Fieldbus mode active" bit in the status word.

For safety reasons, you must also enable the MOVIDRIVE® B inverter at the terminals for control via the fieldbus system. Therefore, you must wire and program the terminals in such a way that the inverter is enabled via the input terminals. For example, the simplest way of enabling the inverter at the terminals is to connect the DIØØ (function /CONTROL INHIBIT) input terminal to a +24 V signal and to program input terminals DIØ1 to DIØ7 to NO FUNCTION.

7.4 Setting the MOVITRAC® B frequency inverter



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To control the MOVITRAC® B frequency inverter via Modbus/TCP, you must first set the inverter to *Control signal source (P101)* and *Setpoint source (P100)* = SBus. The SBus setting means the MOVITRAC® B parameters are set for control and setpoint entry via gateway. MOVITRAC® B then responds to the process output data transmitted by the PLC.

It is necessary to set the SBus1 timeout interval (P883) to a value other than 0 ms for the MOVITRAC® B inverter to stop if faulty SBus communication occurs. We recommend a value in the range 50 to 200 ms. Activation of the control signal source and setpoint source SBus is signaled to the higher-level controller using the "SBus mode active" bit in the status word.

For safety reasons, you must also enable MOVITRAC® B at the terminals for control via the fieldbus system. Therefore, you must wire and program the terminals in such a way that the MOVITRAC® B is enabled via the input terminals. The simplest way of enabling the MOVITRAC® B at the terminals is, for example, to connect the DIØ1 (function CW/STOP) input terminal to a +24 V signal and to program the remaining input terminals to NO FUNCTION.

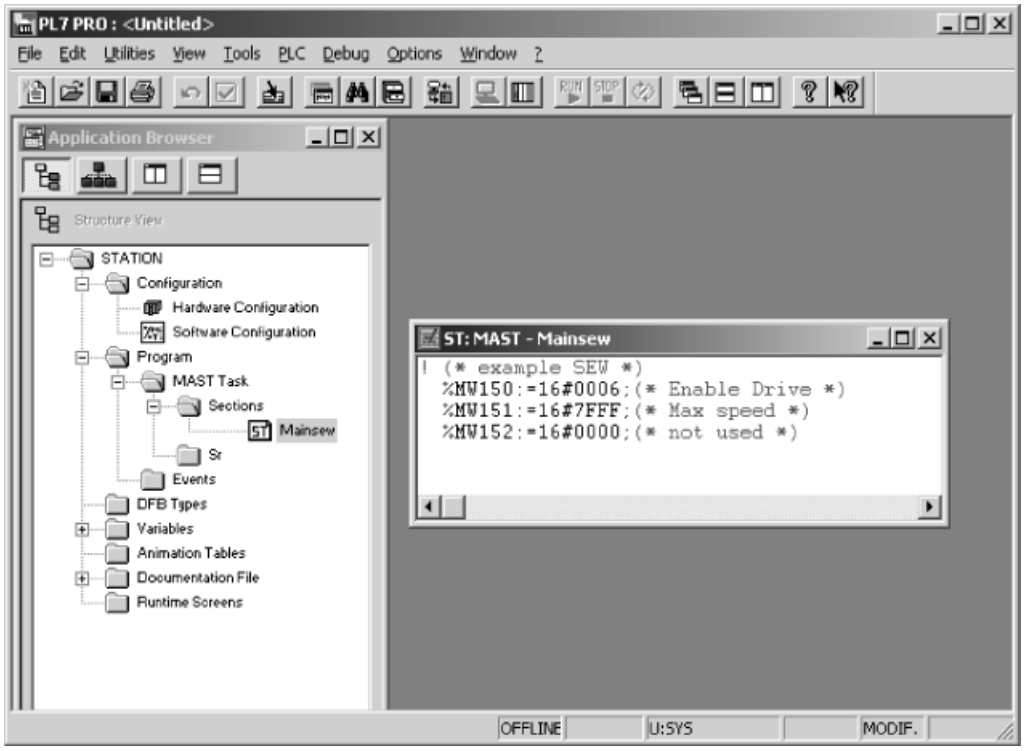
TIPS

- Set the parameter *P881 SBus address* to values of 1 and upwards in ascending order.
- The SBus address 0 is used by DFE33B gateway and therefore must not be used.
- Set *P883 SBus timeout* to values between 50 and 200 ms.

7.5 Project planning examples in PL7 PRO

7.5.1 MOVIDRIVE® B with 3 PD data exchange

1. Set the IP address of the DFE33B (see section "Setting the IP address parameters").
2. Then follow sections 7.2 and 7.2.1 to add MOVIDRIVE® B with DFE33B to the configuration for IO scanning.
3. Set the communication parameters of MOVIDRIVE® B as described in section 7.3.
4. Integration into the PLC project can now begin.
5. Create a new section in PL7 PRO in the application browser under Station / Program / Mast Task / Sections.
6. In this example, the setpoints for the drive start from MW150 (see following figure). Before leaving the factory, the first word is assigned the control word, the second the speed and the third word has no assignment. For the coding of the setpoints and actual values, refer to the fieldbus unit profile and the list of parameters.



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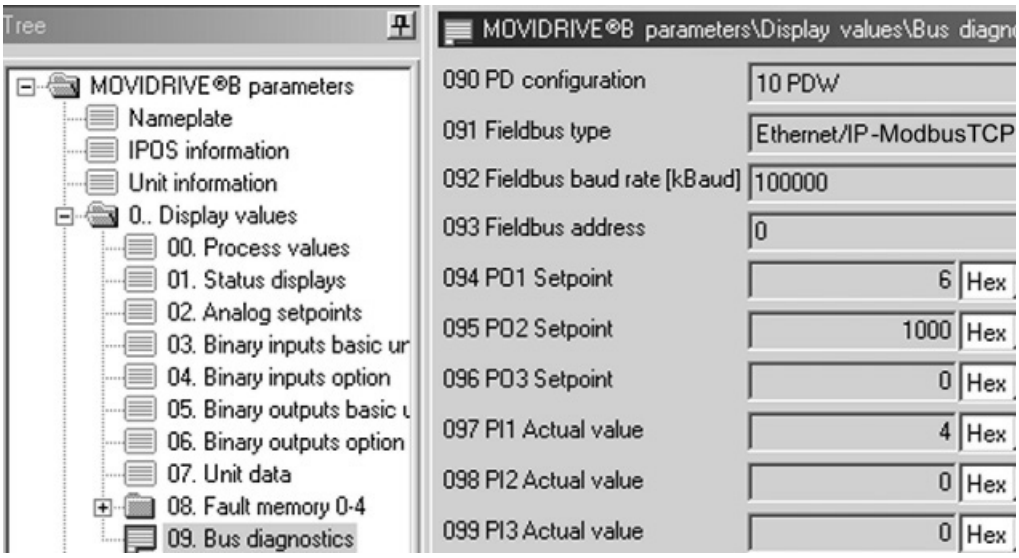
7. The process data should correspond with the values displayed in the MOVITOOLS® MotionStudio parameter tree (see following figure).



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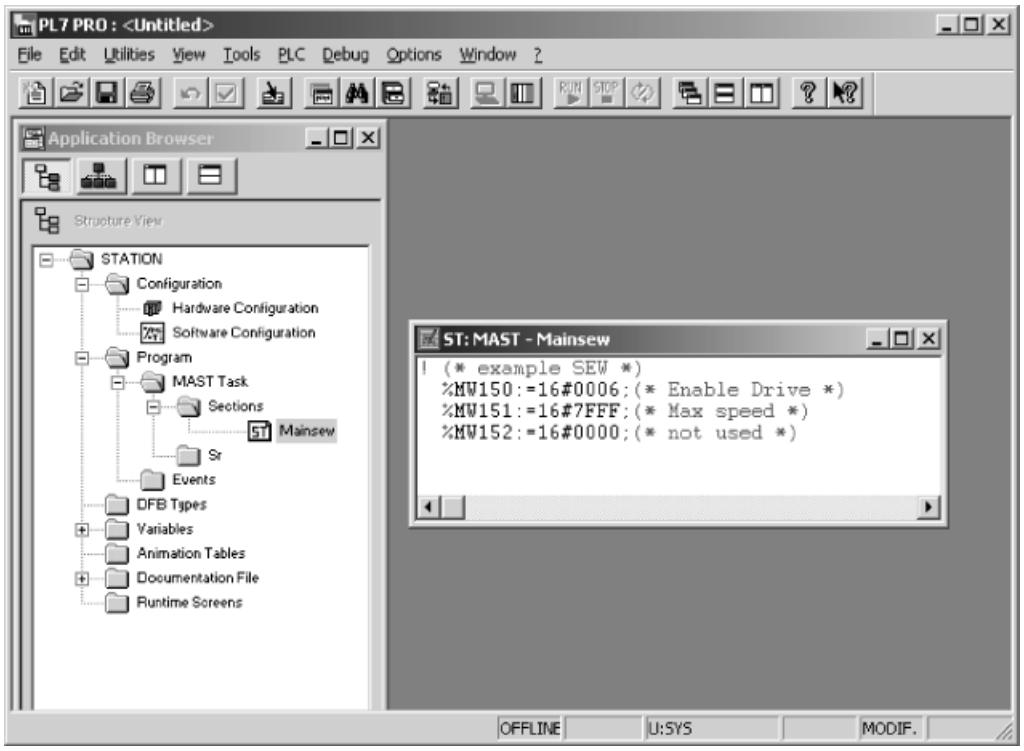
7.5.2 MOVITRAC® B via gateway DFE33B / UOH11B

1. Set the IP address of the DFE33B option (see section "Setting the IP address parameters").
2. Then follow sections 7.2 and 7.2.2 to add the DFE33B gateway to the configuration for IO scanning.
3. Execute the Auto Setup function of the DFE33B gateway according to section 7.3 to configure the data mapping to the drives.
4. Set the communication parameters of MOVITRAC® B as described in section 7.4.
5. Integration into the PLC project can now begin.
6. The setpoints for the drive start from MW150 (see following figure). Before leaving the factory, the first word is assigned the control word, the second the speed and the third word has no assignment. For the coding of the setpoints and actual values, refer to the fieldbus unit profile and the list of parameters.



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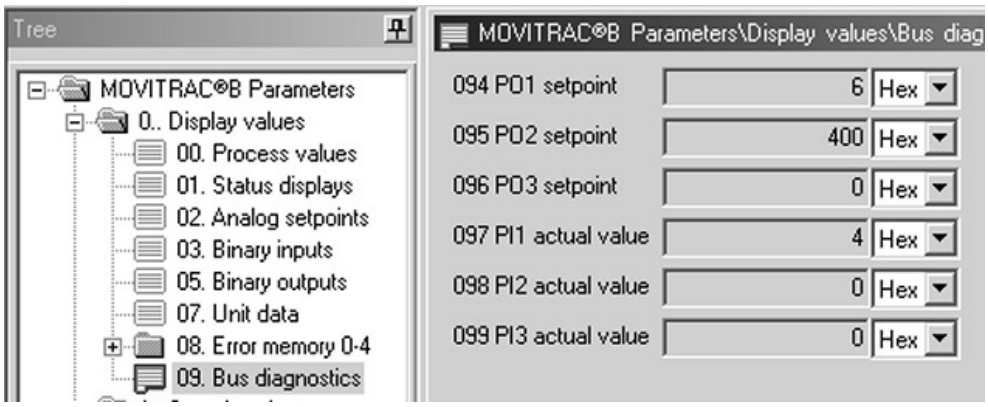
7. The process data should correspond with the values displayed in the gateway configurator for the DFE33B or in the MOVITOOLS® MotionStudio parameter tree (see following figure).



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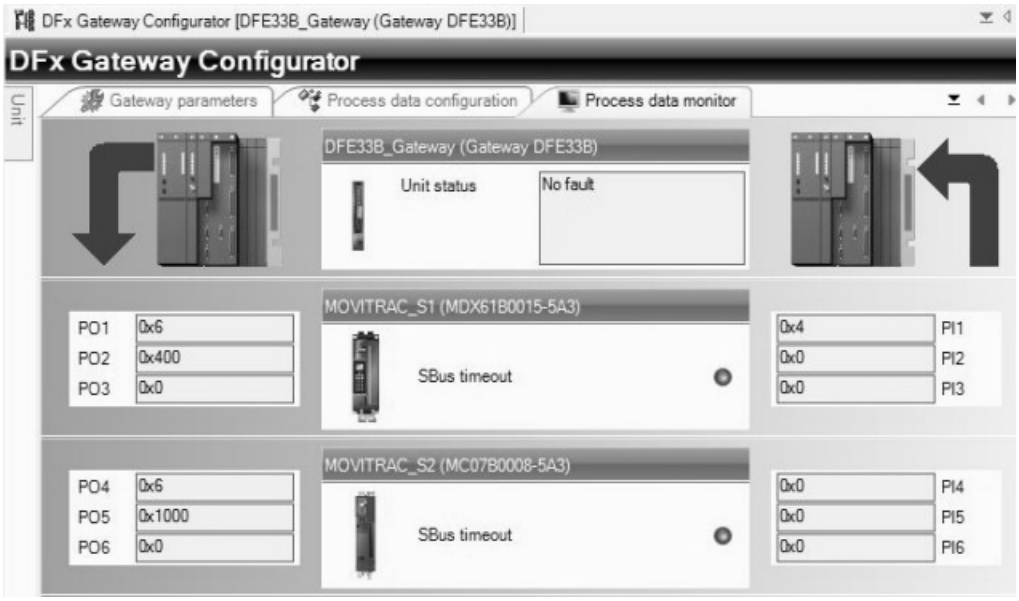

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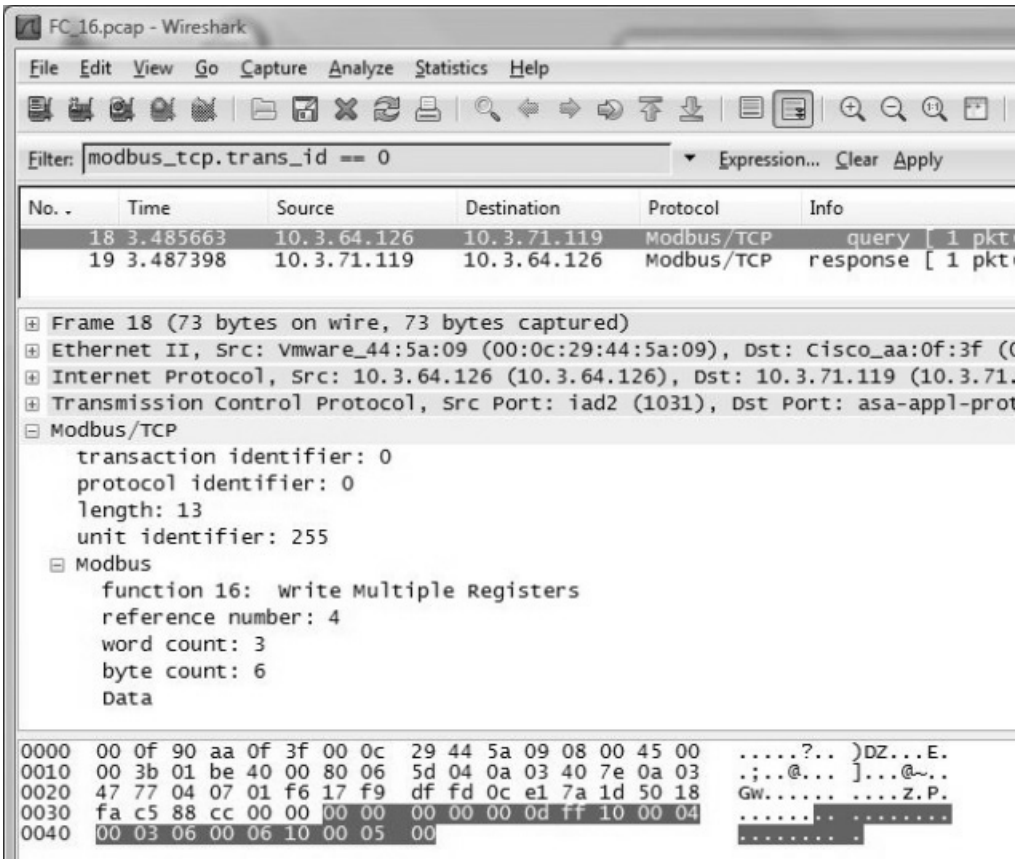
7.6 Examples for data exchange via Modbus/TCP

As there is a range of master systems and software solutions for standard PCs available for Modbus/TCP, there is no "reference controller" which is used to create all examples. For this reason, you will find detailed examples for the message structure in this section.

You can compare the message structure in your own applications with the message structure in these examples for troubleshooting. Simple tools for recording telegrams via the Ethernet network are e.g. Wireshark (see following figure), Packetizer, or similar. You can obtain these tools from the Internet and install them free of charge.

Note that to record (trace) all Ethernet telegrams in a network you must have a tab, hub or switch with the port mirroring function. The telegrams that are sent to and from the PC which is used for recording can, of course, still be written down.


FC_16.pcap - Wireshark
File Edit View Go Capture Analyze Statistics Help
Filter: modbus_tcp.trans_id == 0
Expression... Clear Apply
No. Time Source Destination Protocol Info
18 3.485663 10.3.64.126 10.3.71.119 Modbus/TCP query [1 pkt
19 3.487398 10.3.71.119 10.3.64.126 Modbus/TCP response [1 pkt
Frame 18 (73 bytes on wire, 73 bytes captured)
Ethernet II, Src: Vmware_44:5a:09 (00:0c:29:44:5a:09), Dst: Cisco_aa:0f:3f (
Internet Protocol, Src: 10.3.64.126 (10.3.64.126), Dst: 10.3.71.119 (10.3.71.
Transmission Control Protocol, Src Port: iad2 (1031), Dst Port: asa-appl-prot
Modbus/TCP
transaction identifier: 0
protocol identifier: 0
length: 13
unit identifier: 255
Modbus
function 16: Write Multiple Registers
reference number: 4
word count: 3
byte count: 6
Data
0000 00 0f 90 aa 0f 3f 00 0c 29 44 5a 09 08 00 45 00 .....?..)DZ...E.
0010 00 3b 01 be 40 00 80 06 5d 04 0a 03 40 7e 0a 03 .;..@...]...@~..
0020 47 77 04 07 01 f6 17 f9 df fd 0c e1 7a 1d 50 18 Gw...... ....z.P.
0030 fa c5 88 cc 00 00 00 00 00 00 00 0d ff 10 00 04 ....
0040 00 03 06 00 06 10 00 05 00 ..... .

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For example, the figure above shows how setpoints are written (FC16) to the Modbus/TCP slave with IP address 10.3.71.119. The three process data words are located after offset 4 (reference number) and are addressed via the unit ID 255.

In all other examples, only the Modbus/TCP part of the telegram is described. The TCP/IP part of the telegram and the establishing and disconnecting of a TCP/IP connection are not examined in detail.

7.6.1 Writing and reading process data

Process data exchange can be carried out either via FC3 (read) and FC16 (write) or via FC23 (write and read).

When writing three process data words (setpoints) on a Modbus/TCP slave via FC16, the TCP/IP telegram at port 502 is structured as shown above.

Byte	Value	Meaning	Interpretation	Help
0	0x00	Transaction identifier		For a detailed description see Modbus/TCP specifications and section "Modbus protocol (Modbus/TCP)"
1				
2	0x00	Protocol identifier		
3				
4	0x00	Length field	Number of bytes after byte 5: 3 (no. of PD) × 2 + 7 = 13	
5	0x0d			
6	0xFF	Unit identifier	Must be 0 or 255	
7	0x10	Function code	Service = FC16 (write register)	
8	0x00	Write reference number	Offset from where the PD is located: Must always be 4	
9	0x04			
10	0x00	Write word count	No. of PD (here 3): Must be PD 1 to 10 for DFE33B in MOVIDRIVE® B 3, 6, 9, ... 24 for DFE33B as gateway	
11	0x03			
12	0x06	Write byte count	No. of PD × 2 = 6	
13	0x00	Data	Process output data word 1, e. g. control word (0x0006 = enable)	For data mapping and definition see unit setting and SEW unit profile
14	0x06			
15	0x10		Process output data word 2, e. g. setpoint speed	
16	0x00			
17	0x05		Process output data word 3, e. g. ramp time	
18	0x00			

Only bytes 0-11 are returned in the response telegram of port 502 of the Modbus/TCP slave, where all values remain unchanged with the exception of byte 5. Byte 5 (low byte length field) is corrected accordingly to the value 6.

During process data exchange via FC23, the telegram that is used to write and read 3 process data words (PD) each is structured as follows.

Byte	Value	Meaning	Interpretation	Help
0	0x00	Transaction identifier		For a detailed description see Modbus/TCP specifications and section "Modbus protocol (Modbus/TCP)"
1				
2	0x00	Protocol identifier		
3				
4	0x00	Length field	Number of bytes after byte 5: 3 (no. of PD) × 2 + 11 = 17	
5	0x11			
6	0xFF	Unit identifier	Must be 0 or 255	
7	0x10	Function code	Service = FC23 (read + write register)	
8	0x00	Read reference number	Offset from where the PD is located: Must always be 4	
9	0x04			
10	0x00	Read word count	No. of PD (here 3): Must be PD 1 to 10 for DFE33B in MOVIDRIVE® B 3, 6, 9, ... 24 for DFE33B as gateway	
11	0x03			
12	0x00	Write reference number	Offset from where the PD is located: Must always be 4	
13	0x04			
14	0x00	Write word count	No. of PD (here 3): See Read word count	
15	0x03			
16	0x06	Write byte count	No. of PD × 2 = 6	
17	0x00	Data	Process output data word 1, e. g. control word (0x0006 = enable)	For data mapping and definition see unit setting and SEW unit profile
18	0x06			
19	0x00		Process output data word 2, e. g. setpoint speed	
20	0x00			
21	0x05		Process output data word 3, e. g. ramp time	
22	0x00			

The following data bytes are then returned to the response telegram of Modbus/TCP slave.

Byte	Value	Meaning	Interpretation	Help
0	0x00	Transaction identifier		For a detailed description see Modbus/TCP specifications and section "Modbus protocol (Modbus/TCP)"
1				
2	0x00	Protocol identifier		
3				
4	0x00	Length field	Number of bytes after byte 5: 3 (no. of PD) × 2 + 3 = 9	
5	0x09			
6	0xFF	Unit identifier	Must be 0 or 255	
7	0x17	Function code	Service = FC23 (read + write register)	
8	0x06	Write byte count	No. of PD × 2 = 6	
9	0x00	Data	Process input data word 1, e. g. status word	For data mapping and definition see unit setting and SEW unit profile
10	0x07			
11	0x10		Process input data word 2, e. g. actual speed	
12	0x00			
13	0x05		Process input data word 3, e. g. current actual value	
14	0x00			

7.6.2 Parameter access

FC23 is suitable for parameter access via the MOVILINK® parameter channel as the Modbus/TCP service can be used to send the request to the MOVILINK® service and receive the response.

The TCP/IP telegram is structured as follows for reading a parameter.

Byte	Value	Meaning	Interpretation	Help
0	0x00	Transaction identifier		For a detailed description see Modbus/TCP specifications and section "Modbus protocol (Modbus/TCP)"
1				
2	0x00	Protocol identifier		
3				
4	0x00	Length field	Number of bytes after byte 5: Must be equal to 19 for MOVILINK®	
5	0x13			
6	0xFF	Unit identifier	1)	
7	0x17	Function code	Service = FC23 (read + write register)	
8	0x02	Read reference number	Offset from where the MOVILINK® parameter channel is located: Must always be 512	
9	0x00			
10	0x00	Read word count	Must always be 4 for the MOVILINK® parameter channel.	
11	0x04			
12	0x02	Write reference number	Offset from where the MOVILINK® parameter channel is located: Must always be 512	
13	0x00			
14	0x00	Write word count	Must always be 4 for the MOVILINK® parameter channel.	
15	0x04			
16	0x08	Write byte count	8 byte MOVILINK®	
17	0x31	Data: MOVILINK® parameter channel	Management byte: 0x31 = read	For data mapping and definition see unit setting and SEW unit profile
18	0x00		Parameter subindex	
19	0x20		Parameter index: 0x206c = 8300 = firmware part number	
20	0x6C			
21	0x00		Parameter value. Insignificant for read service	
22	0x00			
23	0x00			
24	0x00			

1) The unit identifier 0 and 0xFF is used to access the parameters of DFE33B directly. For other values, the request is passed on to a lower-level unit (unit identifier = SBus address). This allows parameter access for inverters that are connected via a DFE33B gateway without any restrictions.
See the "Appendix" for a schematic representation of the parameter access to lower-level units.

The response telegram contains the response to the MOVILINK® read service.

Byte	Value	Meaning	Interpretation	Help
0	0x00	Transaction identifier		For a detailed description see Modbus/TCP specifications and section "Modbus protocol (Modbus/TCP)"
1				
2	0x00	Protocol identifier		
3				
4	0x00	Length field	Number of bytes after byte 5: Must be equal to 11 for MOVILINK®	
5	0x11			
6	0xFF	Unit identifier	1)	
7	0x17	Function code	Service = FC23 (read + write register)	
8	0x08	Byte count	8 byte MOVILINK®	
9	0x31	Data: MOVILINK® parameter channel	Management byte: 0x31 = read	For data mapping and definition see unit setting and SEW unit profile
10	0x00		Parameter subindex	
11	0x20		Parameter index: 0x206c = 8300 = firmware part number	
12	0x6C			
13	0x00		The parameter value 0xA82e5b0d corresponds to firmware part number 28216102.53	
14	0x00			
15	0x00			
16	0x00			

1) The unit identifier 0 and 0xFF is used to access the parameters of DFE33B directly. For other values, the request is passed on to a lower-level unit (unit identifier = SBus address). This allows parameter access for inverters that are connected via a DFE33B gateway without any restrictions.
See the "Appendix" for a schematic representation of parameter access to lower-level units.

8 Modbus Protocol (Modbus/TCP)

8.1 Introduction

Modbus/TCP is an open protocol based on TCP/IP. It has become established as one of the first standard solutions for industrial Ethernet interface modules for process data transfer.

Modbus frames are exchanged via TCP/IP port 502. Every master IP address is accepted. Modbus exclusively uses the coding "BIG ENDIAN" (Motorola data format or high byte first).

Access is not possible via "Peer Cop". Ensure that the bus master used supports "IO scanning".

Modbus/TCP is integrated into the DFE33B option as of firmware version .11.

8.1.1 Mapping and addressing

The logical Modbus address range includes 64 k words and is addressed using the reference number (offset). There can be four different tables in the address range:

- Binary inputs (RO)
- Binary outputs (RW)
- Input register (RO)
- Output register (RW)

The tables can be separate or can overlap.

The DFE33B option provides the following data areas:

- A table is created for process data transfer that permits both write access (for setpoints) and read access (for actual values).

  This table begins at offset 4 and ends at offset $0FF_{hex}$. Depending on how the DFE33B is used, there are 10 to 24 cyclically transmitted process data words in it.
- The process data output words from the controller are also saved in another table. This table allows for the current setpoints to be read on one or several other clients (e. g. visualization).

  This table begins at offset 104_{hex} and ends at offset $1FF_{hex}$.
- Parameter access is implemented in a third table.

  This table begins at offset 200_{hex}, ends at offset $2FF_{hex}$ and contains four words of the MOVILINK® parameter channel (see "Fieldbus Unit Profile" manual).
- The other address range of offset 400_{hex} to $FFFF_{hex}$ is reserved and must not be addressed.

  The data word at offset 219_{hex} (8606_{dec}) is a special case that allows you to write (and read) the timeout monitoring time.

	TIP
	Note the following for control systems from Schneider Electric: The address range frequently begins at 40001_{hex}. This corresponds to the value "0" for the offset.

8.1.2 Services (function codes)

For process data exchange, parameter data exchange and unit identification, the DFE33B option provides four service FCs (**F**unction **C**odes).

- FC 3 Read Holding Registers
- FC16 Write Multiple Registers
- FC23 Read/Write Multiple Registers
- FC43 Read Device Identification

The FC3 and FC16 services allow reading or writing of one or more registers. FC23 allows a register block to be read and written simultaneously. You can identify a unit with service FC43 by reading out the identity parameter.

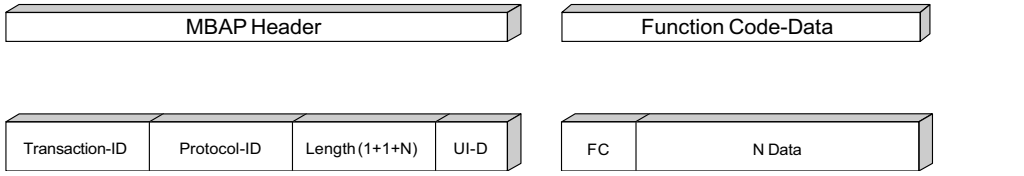
8.1.3 Access

The implemented registers and possible services (function codes) for data exchange are summarized in the following table.

	Meaning for			
Offset (hex)	**Read**	**Write**	**Access**	**Comment**
0 – 3	–	–	–	Reserved
4 – FF	Process input data (actual values)	Process output data (setpoints)	FC3, FC16, FC23	• DFE33B: 0 – 10 words • DFE33B gateway. 3 – 24 words (in steps of 3)
100 – 103	–	–	–	Reserved
104 – 1FF	Process output data (setpoints)	–	FC3	Used by clients other than the controlling client for reading the setpoints
200 – 2FF	Result acyclic parameter channel	Request acyclic parameter channel	FC3, FC16, FC23	4 words
300 – FFFF	–	–	–	Reserved
Special case: 219E (8606_{dec})	Fieldbus timeout interval, read value	Fieldbus timeout interval, write value	FC3, FC16	Parameter P819: 16 bit value, timeout interval in ms

8.2 Protocol structure

The Modbus protocol consists of a header and function code data. The header is the same for all request and response telegrams and error messages (exceptions). A varying number of data is added to it depending on the function code (see following figure).



8.2.1 Header

The protocol bytes of the header are described in the following table:

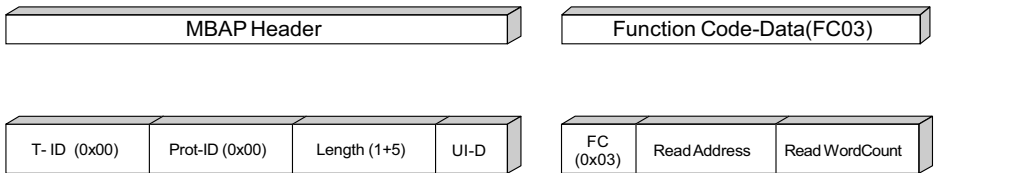
Byte	Designation	Meaning
0	Transaction identifier	"0" is often simply copied by the server (slave)
1		
2	Protocol identifier	0
3		
4	Length field (upper byte)	0
5	Length field (lower byte)	Number of function codes data bytes + 1 (unit identifier)
6	Unit identifier (slave address)	This is the slave address. It must be set to "0" (0x00) or 255 (0xFF) to access the DFE33B process data. The following address assignments apply when accessing the parameter channel (offset 200 – 203_{hex}): • 0 or 255 for parameters of MOVIDRIVE® B, if the DFE33B option is installed in a MOVIDRIVE® B. • 0 or 255 for parameters of the DFE33B gateway itself • 1 – 63 for parameters of a unit connected to the DFE33B gateway via SBus. Unit identifier = SBus address.
7	Function code	Required service
8 ...	Data	Data depending on required service

- The transaction identifier (byte 0 and 1) is simply copied by the slave. It can identify related actions for the master.
- The protocol identifier (byte 2 and 3) must always be "0".
- The length bytes (byte 4 and 5) specify the number of bytes occurring in the length field. As the maximum telegram length is 255 bytes, the "upper byte" must be "0".
- The unit identifier (byte 6) can be used to differentiate between several connected stations (e. g. bridges or gateways). It has the function of a subaddress that is only used for parameter access in SEW units. Process data is always mapped in the unit that is addressed via the unit identifier 0 or FF_{hex}.

  See the "Appendix" for a schematic representation of the parameter access to lower-level units.
- The seven bytes of the header are followed by function code and data.

8.2.2 Service FC3 – Read Holding Registers

A variable number of registers can be read with the service *FC3 Read Holding Registers* (see following figure).



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Example

Request:

Byte	Designation	Meaning / permitted values
0 - 6	MBAP header	See section "Header"
7	Function code	Required service: 3 (Read Holding Registers)
8	Reference number (high)	Offset
9	Reference number (low)	Offset
10	Word count (high)	Number of words (register)
11	Word count (low)	Number of words (register)

Response:

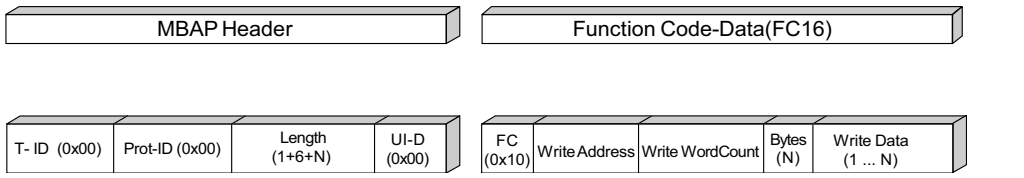
Byte	Designation	Meaning / permitted values
0 - 6	MBAP header	See section "Header"
7	Function code	Service: 3 (Read Holding Register)
8	Byte count	Number of following bytes
9....	Data	2 – ... data bytes depending on the length

Exception:

Byte	Designation	Meaning / permitted values
0 - 6	MBAP header	See section "Header"
7	Function code	83_{hex}
8	Exception code	Fault code

8.2.3 Service FC16 – Write Multiple Registers

A variable number of registers can be written with the service *FC16 Write Multiple Registers* (see following figure).



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Example

Request:

Byte	Designation	Meaning / permitted values
0 - 6	MBAP header	See section "Header"
7	Function code	Required service: 16 (Write Multiple Registers)
8	Reference number (high)	Offset
9	Reference number (low)	Offset
10	Word count (high)	Number of words (register)
11	Word count (low)	Number of words (register)
12	Byte count	2* word count
13 ...	Register values	2 – ... data bytes depending on the length

Response:

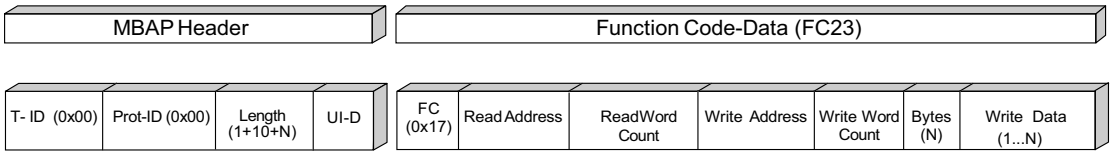
Byte	Designation	Meaning / permitted values
0 - 6	MBAP header	See section "Header"
7	Function code	Service: 16 (Write Multiple Registers)
8	Reference number (high)	Offset
9	Reference number (low)	Offset
10	Word count (high)	Number of words (register)
11	Word count (low)	Number of words (register)

Exception:

Byte	Designation	Meaning / permitted values
0 - 6	MBAP header	See section "Header"
7	Function code	90_{hex}
8	Exception code	Fault code

8.2.4 Service FC23 – Read/Write Multiple Registers

A variable number of registers can be written and read at the same time with the service *FC23 Read/Write Multiple Registers* (see following figure). Write access takes place first. This service is primarily used for process data (see following figure).



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Example

Request:

Byte	Designation	Meaning / permitted values
0 - 6	MBAP header	See section "Header"
7	Function code	Required service: 23 (Read/Write Multiple Registers)
8	Read reference number (high)	Offset
9	Read reference number (low)	Offset
10	Read word count (high)	Number of words (register) always 0
11	Read word count (low)	Number of words (register)
12	Write reference number (high)	Offset
13	Write reference number (low)	Offset
14	Write word count (high)	Number of words (register) always 0
15	Write word count (low)	Number of words (register)
16	Write byte count	2* word count
17 ...	Write register values	2 – ... data bytes depending on the length

Response:

Byte	Designation	Meaning / permitted values
0 - 6	MBAP header	See section "Header"
7	Function code	Service: 23 (Read/Write Multiple Registers)
8	Byte count	Number of following bytes
9	Data	2 – ... Data bytes depending on the length

Exception:

Byte	Designation	Meaning
0 - 6	MBAP header	See section "Header"
7	Function code	97_{hex}
8	Exception code	Fault code

8.2.5 Service FC43 – Read Device Identification

The service *FC43 Read Device Identification* is also referred to as MEI ("Modbus Encapsulated Interface Transport"). It can tunnel services and method calls. The service *Read Device Identification* is tunneled with the MEI type 0x0E. In accordance with Modbus specifications, there are 3 blocks (*Basic*, *Regular* and *Extended*) that can be read. The DFE33B option supports the *Basic* and *Regular* blocks (conformity level 02). The entire block is always read (streaming). This means that values 01 and 02 are permitted in the *Read Device ID Code*. The *Object ID* must be zero. The response is not fragmented.

Example

Request:

Byte	Designation	Meaning / permitted values
0 - 6	MBAP header	See section "Header"
7	Function code	Required service: 43 (Read Device Identification)
8	MEI type	0x0E
9	Read device ID code	01 or 02
10	Object ID	0

Response:

Byte	Designation	Meaning / permitted values
0 - 6	MBAP header	See section "Header"
7	Function code	Service: 43 (Read Device Identification)
8	MEI type	0x0E
9	Read device ID code	01 or 02
10	Conformity level	02
11	More follows	0
12	Next object ID	0
13	Number of objects	e. g. 3
14	Object ID	
15	Object length	
16	Object value	
17	....	

Exception:

Byte	Designation	Meaning
0 - 6	MBAP header	See section "Header"
7	Function code	43_{hex}
8	Exception code	Fault code

Objects

- **DFE33B (as option)**

Object ID	Name	Type	M/O	Category	Value (example)
0x00	VendorName	ASCII string	Mandatory	Basic	"SEW-EURODRIVE"
0x01	ProductCode				"SEW-MOVIDRIVE DFE33B"
0x02	MajorMinorRevisions				"823 568 0.10" (e. g.)
0x03	VendorUrl		Optional	Regular	"www.sew.com"
0x04	ProductName				"SEW MOVIDRIVE"
0x05	ModelName				"DFE33B"

- **DFE33B (as gateway)**

Object ID	Name	Type	M/O	Category	Value (example)
0x00	VendorName	ASCII string	Mandatory	Basic	"SEW-EURODRIVE"
0x01	ProductCode				"SEW-GATEWAY DFE33B"
0x02	MajorMinorRevisions				"823 568 0.10" (e. g.)
0x03	VendorUrl		Optional	Regular	"www.sew.com"
0x04	ProductName				"SEW GATEWAY"
0x05	ModelName				"DFE33B"

8.3 Connection management

Up to 8 Modbus connections are possible at the same time. Max. one of these connections can have write access to the process data range (controlling connection).

Any connection that is no longer in use must be closed by the master. If a ninth connection is to be established and the slave detects a connection that is no longer active, it is severed on one side by the slave because it assumes that the associated master is no longer active. If there are 8 active connections, a ninth connection establishment is rejected (the socket is closed on the side of the server). Connections 1 – 8 operate independently of each other. They all have the same priority. Only one controlling connection that can change process data is permitted.

If a controlling connection has already been established via EtherNet/IP, no other controlling connection can be set up via Modbus/TCP. The slave can buffer at least one frame of maximum Modbus length when sending and receiving.

8.3.1 Sending process output data (request controlling connection)

You are only allowed to send process data if the connection is already a controlling connection or if no controlling connection already exists. If the unit accepts the connection, it transfers the process output data to the process data image or transmits the process data to a lower-level station (gateway operation). As long as this connection is active, no other master can change the process output data (PO data).

8.3.2 Closing the connections

A connection is deleted from the internal connection list,

- as soon as the "keep alive" time has elapsed and the server no longer receives a response or
- as soon as the socket returns an error
- when the connection to the client has been severed

  If it was a controlling connection, it means that another controlling connection can be re-established. If no valid PO data has been sent within the timeout interval, a fieldbus timeout is triggered.

The "keep alive" time is set to 10 seconds as the default. If there is a controlling connection and if the timeout interval is set to more than 5 seconds, the "keep alive" time is increased to twice the value of the timeout interval.

In a controlling connection, the fieldbus timeout is displayed in the unit after the set timeout interval elapses during a break in the cable or an error in the socket. Afterwards, a new controlling connection can be established again.

8.3.3 Timeout monitoring

The timeout monitoring time can be set in the range of 0 to 650 s in steps of 10 ms.

- 0 s and 650 s means: Timeout monitoring is switched off
- 10 ms – 649.09 s means: Timeout monitoring is switched on

The timeout interval can be set using:

- Register object $219E_{hex}$ (8606_{dec})
- Parameter access via register object 200_{hex} – 203_{hex} to index 8606
- Parameter *P819 Fieldbus Timeout* in MOVITOOLS® MotionStudio

Timeout monitoring is triggered when a controlling connection is activated. The fieldbus driver periodically checks whether the last update of PO data has been received within the timeout interval.

If the timeout monitoring is deactivated by setting the timeout interval to 0 or 65000, the fieldbus timeout is no longer recognized. This also applies if the controlling connection is severed.

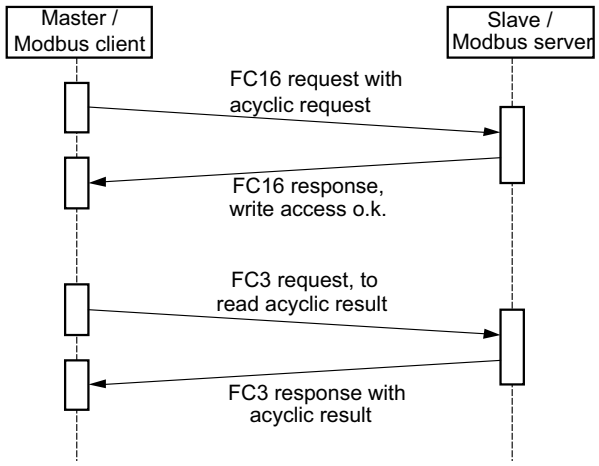
In the event of a timeout, the error response set in parameter *P831 Response fieldbus timeout* is executed. MOVIDRIVE® B with DFE33B option also displays error message F28 (= fieldbus timeout) on the 7-segment display.

8.4 Parameter access via Modbus/TCP

Parameter access via the MOVILINK® parameter channel in the registers 200_{hex} – 203_{hex} via Modbus/TCP require the services FC3, FC16 or FC23 (write and read access). Write access is used to store acyclic requests in the relevant registers. Read services read responses from the same registers.

This method corresponds to the alternative concept from the Modbus specification (section Appendix A) "Network Messaging Specification for the MODBUS/TCP Protocol: Version 1.1".

8.4.1 Procedure with FC16 and FC3



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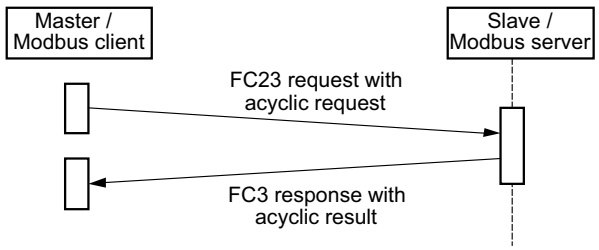
The respective fault code is generated if a write access is incorrect (see section "Fault codes (exception codes)"). This variant has the advantage that the write services are processed simply by sending a *Write Request* (FC16) once and the service confirmation can take place by evaluating the *Write Response*. The master later sends a *Read Request* (FC03) to read out the values that have been written in the register in the meantime.

8.4.2 Procedure with FC23



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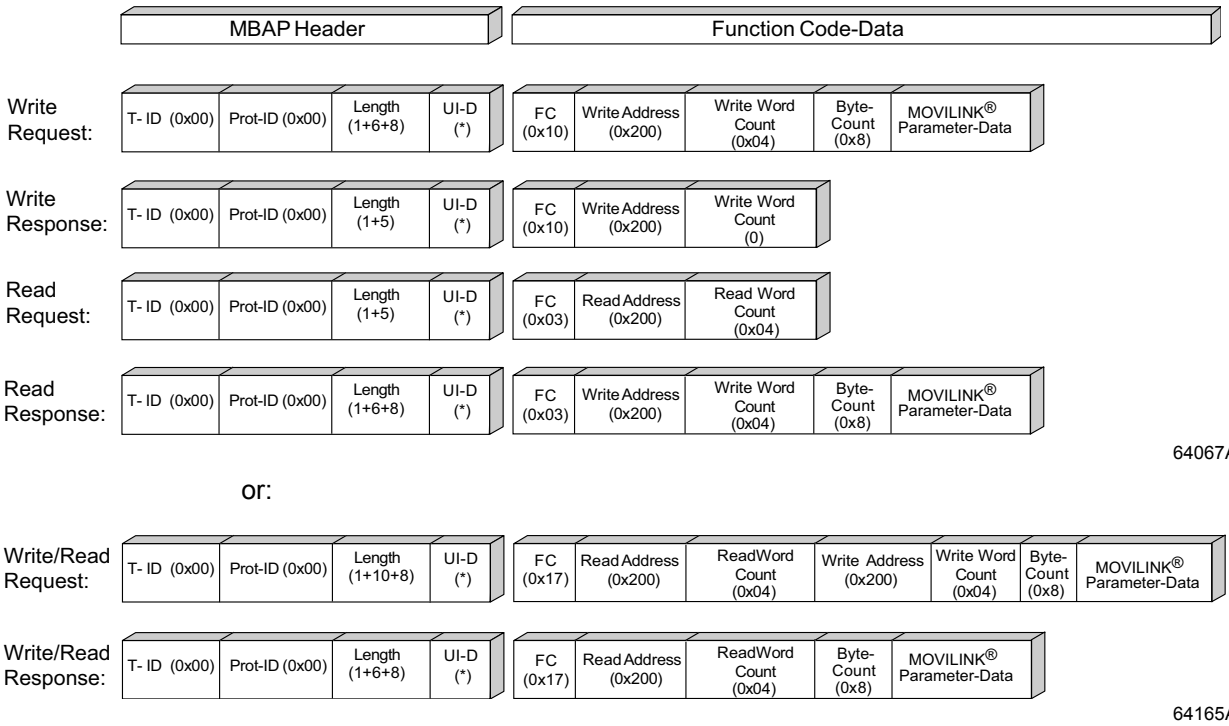
With FC23, the result is returned directly in the response.

8.4.3 Protocol structure



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or:

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* The unit identifier (UI-D) is used in gateway operation to map registers 200_{hex} – 203_{hex} in lower-level stations (see section "Header").

See the section "MOVILINK® parameter channel" for a description of the MOVILINK® parameter data (8 byte) and how they are mapped in registers 200_{hex} – 203_{hex}.

8.4.4 MOVILINK® parameter channel

The following table shows the structure of the MOVILINK® acyclic parameter channel. It contains 8 bytes.

Offset	200_{hex}	200_{hex}	201_{hex}	201_{hex}	202_{hex}	202_{hex}	203_{hex}	203_{hex}
Meaning	Manage-ment	Sub-index	Index high	Index low	MSB data	Data	Data	LSB data
Comment	Manage-ment	Parameter index + subindex			4-byte data			
Example: Write fieldbus timeout (index 8606)	32_{hex}	00_{hex}	21_{hex}	$9E_{hex}$	00_{hex}	00_{hex}	01_{hex}	$F4_{hex}$

You can access the parameter channel with FC3, FC16 and FC23. You can assign a task to the parameter channel in the administration byte when using a write access. The task itself is a MOVILINK® service such as, *Write, Write Volatile* or *Read*. The result can be read with a read access. Refer to the documentation "MOVIDRIVE® Communication and Fieldbus Unit Profile" or "MOVITRAC® Communication" for information on the structure of the parameter channel.

In the example, a request is made to write 500 ms to the fieldbus timeout interval via the MOVILINK® parameter channel:

- Offset 200 = 3200_{hex} (management = write 4 bytes / subindex = 0)
- Offset 201 = $219E_{hex}$ (index = 8606)
- Offset 202 = 0(data high)
- Offset 203 = $01F4_{hex}$ (data low = 500)

8.5 Fault codes (exception codes)

If an error occurs when processing a function code, the Modbus client is informed in an *Exception Response*. The following *Exception Codes* can be returned by an SEW unit.

Exception code (hex)	Name	Meaning
01	ILLEGAL FUNCTION	The function code transferred to the request is not supported by the slave unit.
02	ILLEGAL DATA ADDRESS	An invalid data address was specified for access to the Modbus slave. This may be caused by the following: • Invalid start address when accessing the register of the Modbus slave (not available or the function code cannot be used on this address) • Invalid combination of the start address and length • No symmetrical access for read/write operation • Incorrect object ID (during access via FC43)
03	ILLEGAL DATA VALUE	Part of the Modbus request data field contains an invalid value for the Modbus slave. This may be caused by the following: • The "word count" contains an invalid value (less than 1 or greater than 125) • The received PDU length is too short or too long (depending on the specified "word count") • Internal error when reading or writing the process data
04	SLAVE DEVICE FAILURE	Error when accessing MOVILINK® parameter (e. g. internal timeout)
06	SLAVE DEVICE BUSY	A controlling connection already exists (either from another Modbus controller or another fieldbus system)
0A	GATEWAY PATH UNAVAILABLE	The data cannot be transferred to a subsystem.

9 Integrated Web Server

The DFE33B option card has a homepage for simple web diagnostics of MOVIDRIVE® and MOVITRAC®. To access the start page, start your browser and enter the following IP address of the DFE33B:

Example: http://192.168.10.4

You can use the web page for read access to information about service and diagnostics.

9.1 Software requirements

The website has been tested with Microsoft® Internet Explorer 5.0 and Mozilla® Firefox 2.0. To display dynamic elements you will need the Java 2 Runtime Environment SE, v1.5.0 or higher.

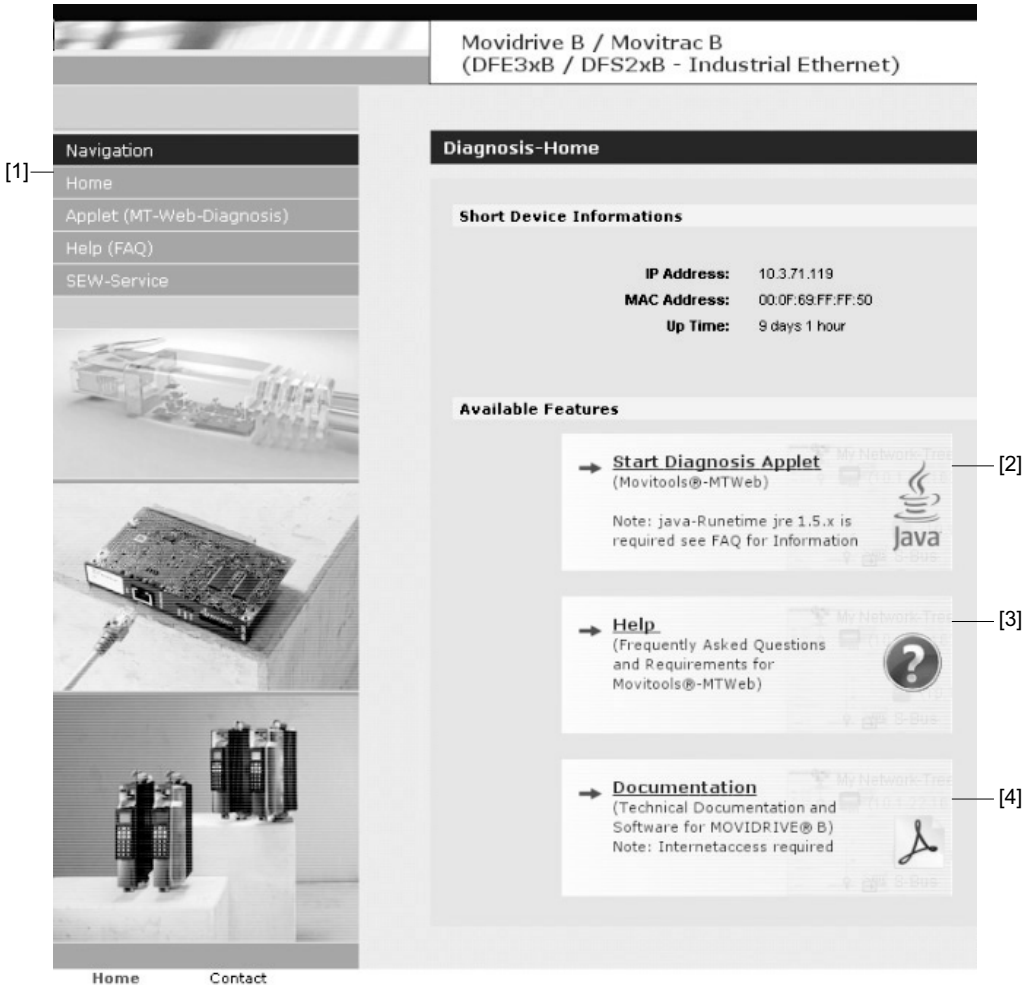
If the Java 2 Runtime environment is not installed on your system, the program will connect to Java and start an automatic download, if you allow it. Should you encounter any problems, you can also download Java 2 Runtime from www.sun.com and install it locally.

9.2 Security settings

If you are using a firewall or if you have a personal firewall installed on your system, they could prevent you from accessing the Ethernet units. In this situation, you should allow outgoing TCP/IP and UDP/IP traffic.

- The applet "sewAppletsMoviEWeb.JAppletWeb" will prompt you to accept a certificate. Click <Execute>. The certificate will be imported to the certificate list of the Java 2 Runtime environment
- Select the checkbox "Always trust content from this publisher" in order to avoid this window for future executions.

9.3 Design of the homepage of the integrated web server



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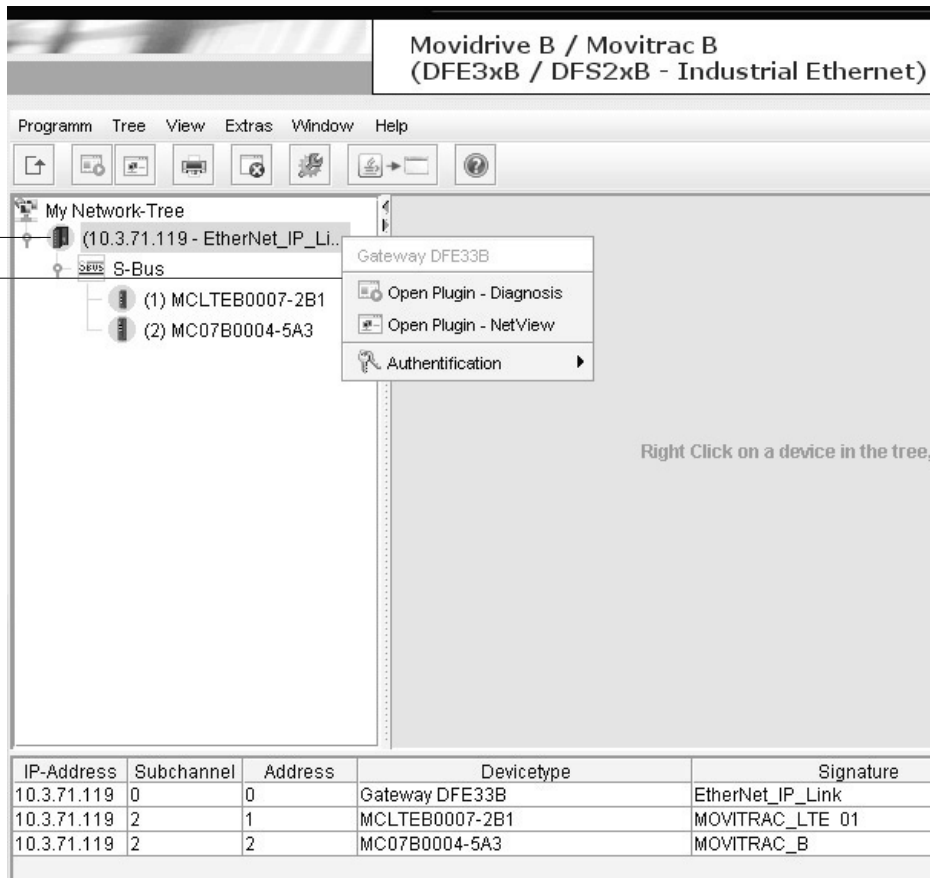
[1] Navigation bar	
[2] Main window (Home)	Button for starting the diagnostics applet
[3] Main window (Home)	Button for displaying website help
[4] Main window (Home)	Link to the MOVIDRIVE® B documentation page (Internet access required)

9.4 Layout of the diagnostics applet



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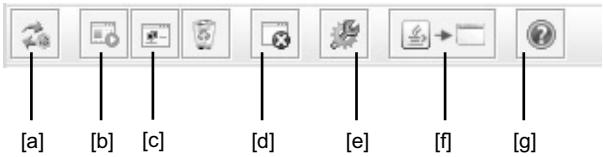
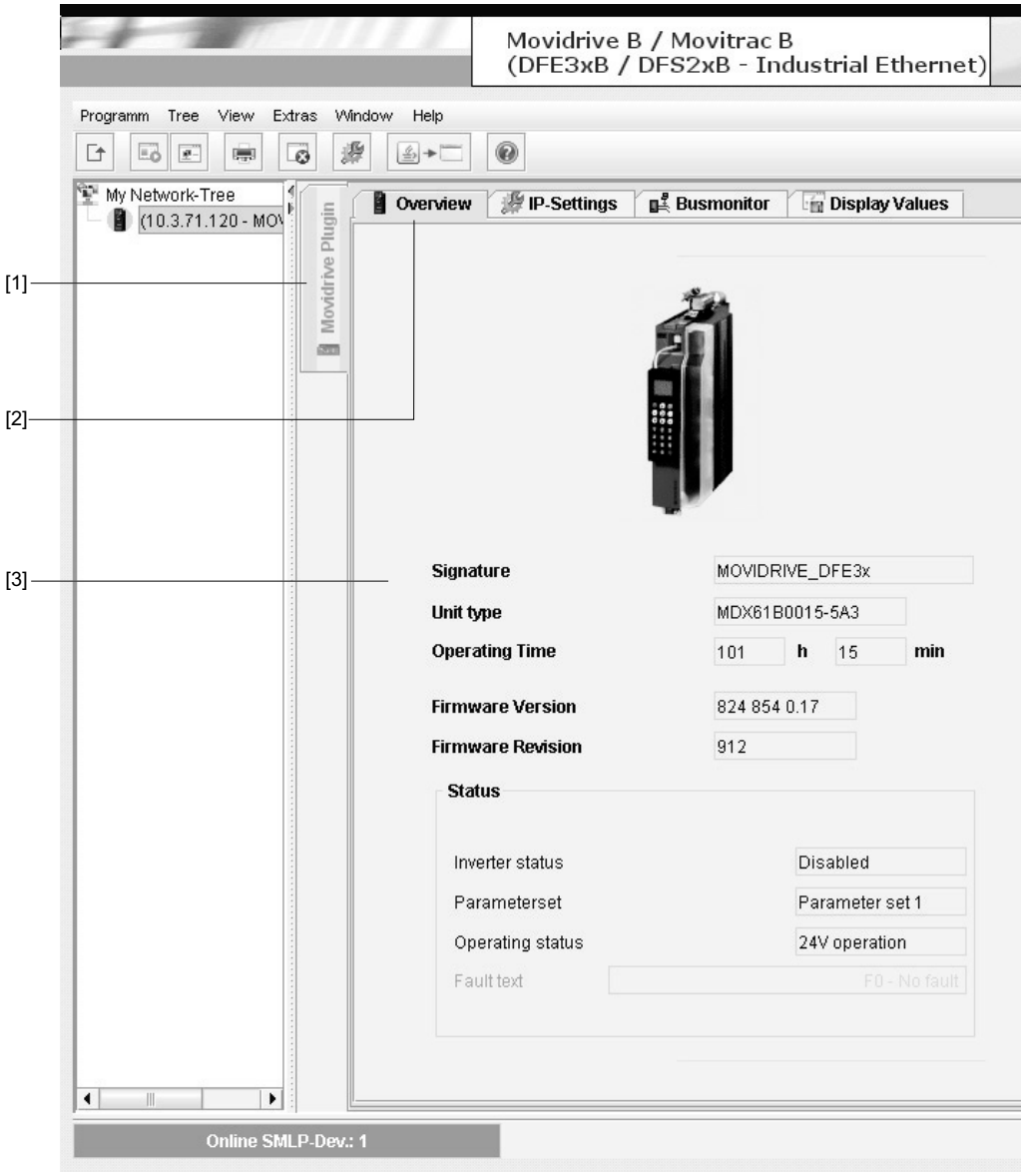
[1] Tree view / Overview	The tree displays the MOVIDRIVE® B Ethernet unit in the network node "My Network Tree". Individual subsystems of the corresponding unit versions are displayed below that; they may contain additional units.
[2] Popup menu when you right-click on a unit in the tree	You can navigate to the plugins of an individual unit by right-clicking a unit in the tree. A popup window appears, which leads you to that unit's plugins. You can also adjust the access settings for a MOVIDRIVE® B (see section "Access protection"). To detect new units and have them displayed in the tree, right-click on the network node and select "Scan".
[3] Toolbar (Quick selection using buttons)	 [a] Rescan unit tree and display it in the tree [b] Open plugin for selected unit in unit tree [c] Overview plugin for selected unit in unit tree, see section "Plugin window (Overview)" [d] Close the selected plugin [e] Settings for Ethernet communication and scanner [f] Change to window mode or applet mode [g] Display information dialog box
[4] Plugin window	See section "Plugin window"
[5] Status table and unit status	The table is visible by default. It lists all units and subunits found during a scan. Since the status table sends cyclic parameter requests to the unit, you can also close the table using the status button (bottom right).

Plugin window



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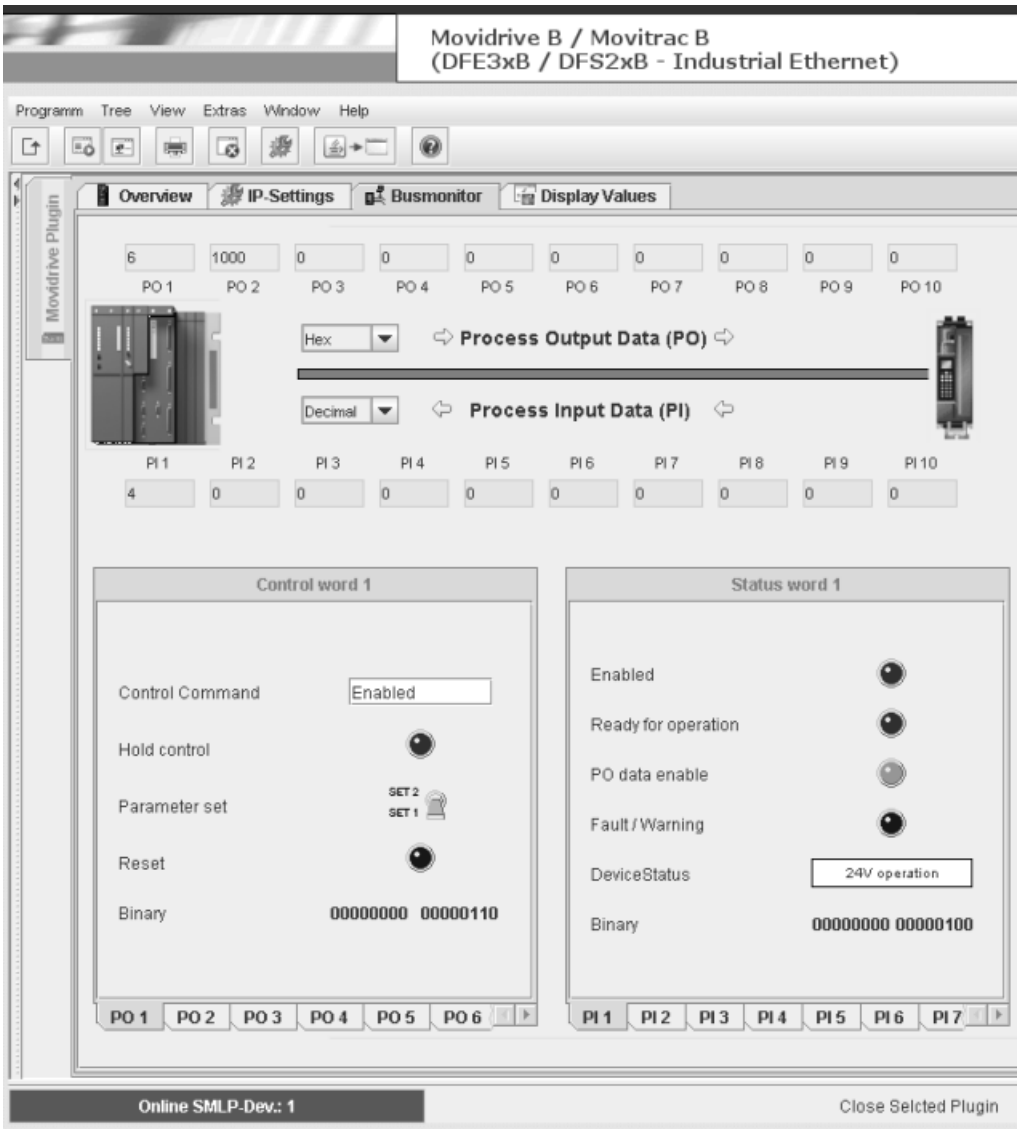
[1] Tab for opened plugins	If several plugins are open (e.g. plugins for various units), they will be listed on the tab.
[2] Tab within the plugin (shows parameter displays being implemented)	If the selected unit has several display columns, the tab will display those columns.
[3] Main window with display values and figures	The main window gives a visualization of the parameters.

Example: Bus monitor plugin for MOVIDRIVE®

This plugin is used to display the process data between the controller and the MOVIDRIVE® B as well as to diagnose the process data assignment.


Movidrive B / Movitrac B
(DFE3xB / DFS2xB - Industrial Ethernet)
Programm Tree View Extras Window Help
Movidrive Plugin
Overview
IP-Settings
Busmonitor
Display Values
6 1000 0 0 0 0 0 0 0 0
PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 PO 9 PO 10
Hex
Process Output Data (PO)
Decimal
Process Input Data (PI)
PI 1 PI 2 PI 3 PI 4 PI 5 PI 6 PI 7 PI 8 PI 9 PI 10
4 0 0 0 0 0 0 0 0 0
Control word 1
Control Command
Enabled
Hold control
Parameter set
SET 2
SET 1
Reset
Binary
00000000 00000110
Status word 1
Enabled
Ready for operation
PO data enable
Fault / Warning
DeviceStatus
24V operation
Binary
00000000 00000100
PO 1 PO 2 PO 3 PO 4 PO 5 PO 6
PI 1 PI 2 PI 3 PI 4 PI 5 PI 6 PI 7
Online SMLP-Dev.: 1
Close Selcted Plugin

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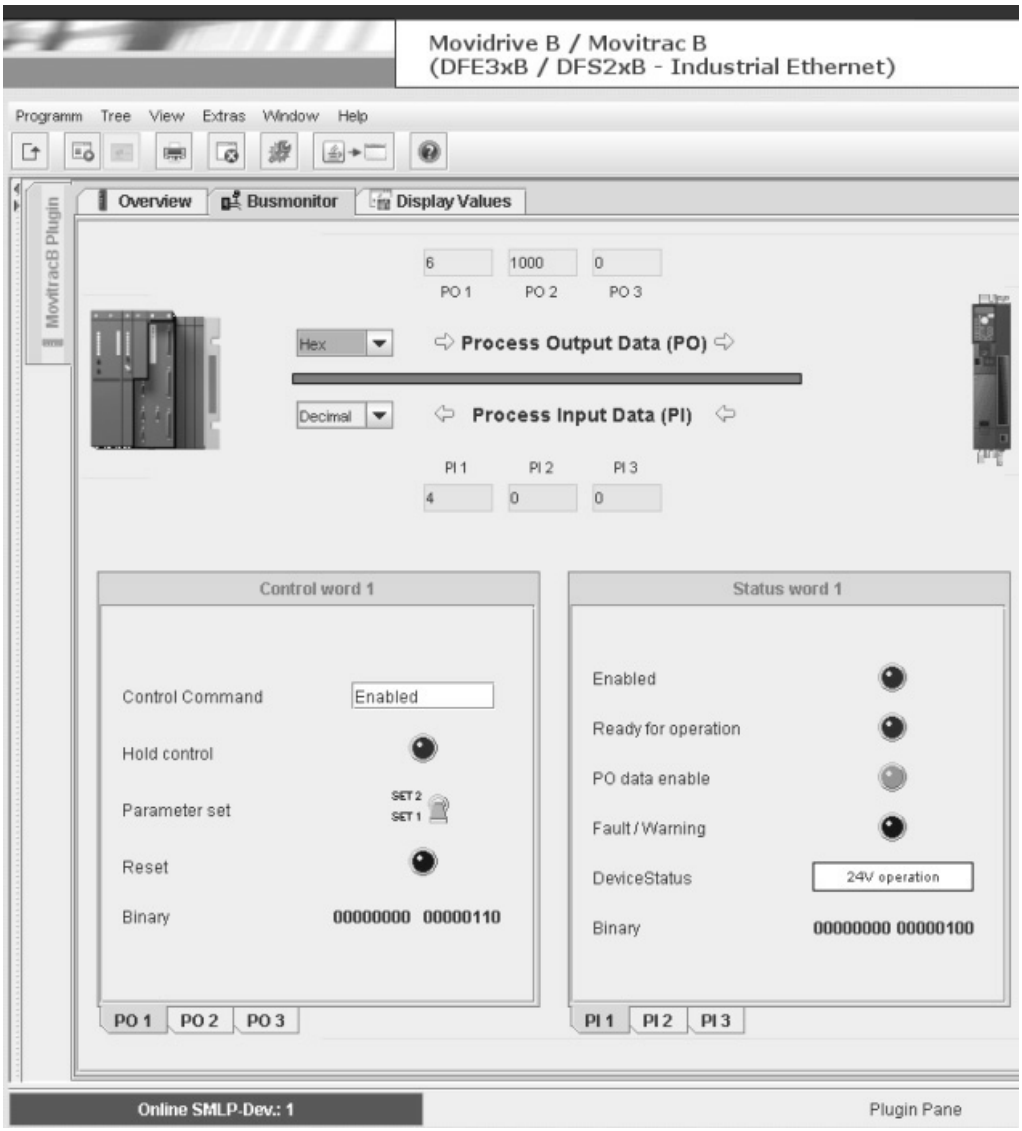
Example: Bus monitor plugin for MOVITRAC®

This plugin is used to display the process data between the controller and MOVITRAC® B as well as to diagnose the process data assignment.



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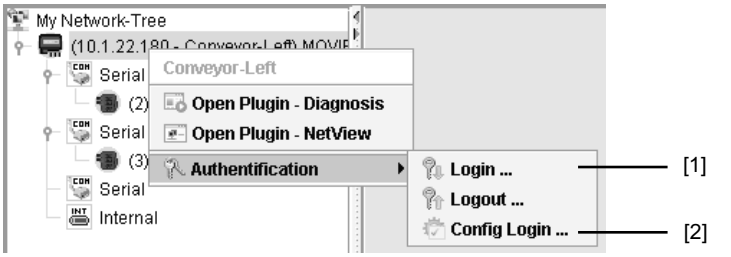
9.5 Access protection

Access to the drive parameters and diagnostics information can be protected by a password. Access protection is deactivated at the factory. You can activate the access protection function by assigning a password [2]. To deactivate the function again, delete the password (blank password).

If access protection is activated, a login dialog [1] will appear to request the saved password.



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[1] Login

[2] Config Login

Under "User" in the login dialog, you can select "Observer" or "Maintenance".

- Observer
  - The drive unit parameters can be read with MOVITOOLS® MotionStudio but cannot be not changed.
  - The current parameter settings can be uploaded from the unit to the PC (parameter set upload).
  - It is not possible to download a parameter set or an IPOS$^{plus®}$ program.
  - Diagnostics via MOVITOOLS® MotionStudio is possible, the scope settings, however, cannot be changed.

- Maintenance
  - MOVITOOLS® MotionStudio can be operated without any limitations.

10 Operating MOVITOOLS® MotionStudio Via Ethernet

10.1 About MOVITOOLS® MotionStudio

10.1.1 Tasks

The MOVITOOLS® MotionStudio software package enables you to perform the following tasks with consistency:

- Establishing communication with units
- Executing functions with the units

10.1.2 Establishing communication with units

The SEW Communication Server is integrated into MOVITOOLS® MotionStudio for establishing communication with the units.

The SEW Communication Server allows you to create **communication channels**. Once the channels are established, the units communicate via these communication channels using their communication options. You can operate up to four communication channels at the same time.

Depending on the unit and its communication options, the following communication channels are available:

- Serial (RS485) via interface adapters
- System bus (SBus) via interface adapters
- Ethernet
- EtherCAT
- Fieldbus
- PROFIBUS DP/DP-V1
- S7-MPI

10.1.3 Executing functions with the units

MOVITOOLS® MotionStudio enables you to perform the following functions with consistency:

- Setting parameters (e. g. in the parameter tree of the unit)
- Startup
- Visualization and diagnostics
- Programming

The following basic components are integrated into MOVITOOLS® MotionStudio, allowing you to use the units to execute functions:

- MotionStudio
- MOVITOOLS®

All functions communicate using **tools**. MOVITOOLS® MotionStudio provides the right tools for every unit type.

10.2 First steps

10.2.1 Starting the software and creating the project

To start MOVITOOLS® MotionStudio and create a project, proceed as follows:

1. Start MOVITOOLS® MotionStudio in the WINDOWS® start menu by following the path below:

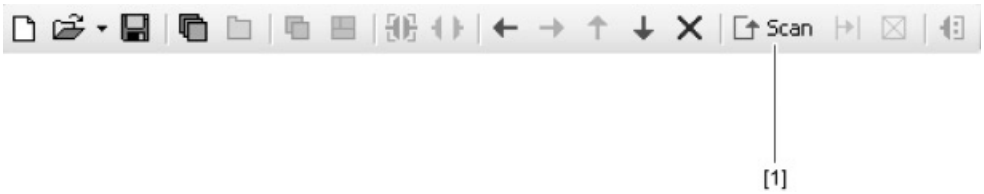
   "Start\Program\SEW\MOVITOOLS-MotionStudio\MOVITOOLS-MotionStudio"
2. Create a project with a name and directory.

10.2.2 Establishing communication and scanning the network

To establish communication with MOVITOOLS® MotionStudio and to scan the network, proceed as follows:

1. Establish a communication channel to communicate with your units.

   For detailed information on how to configure a communication channel, see the section regarding communication type.
2. Scan the network (unit scan). To do so, click the [Start network scan] button [1] found in the toolbar.



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3. Select the unit you want to configure.
4. Open the context menu by clicking the right mouse button.

   This will display unit-specific tools used for executing functions with the units.

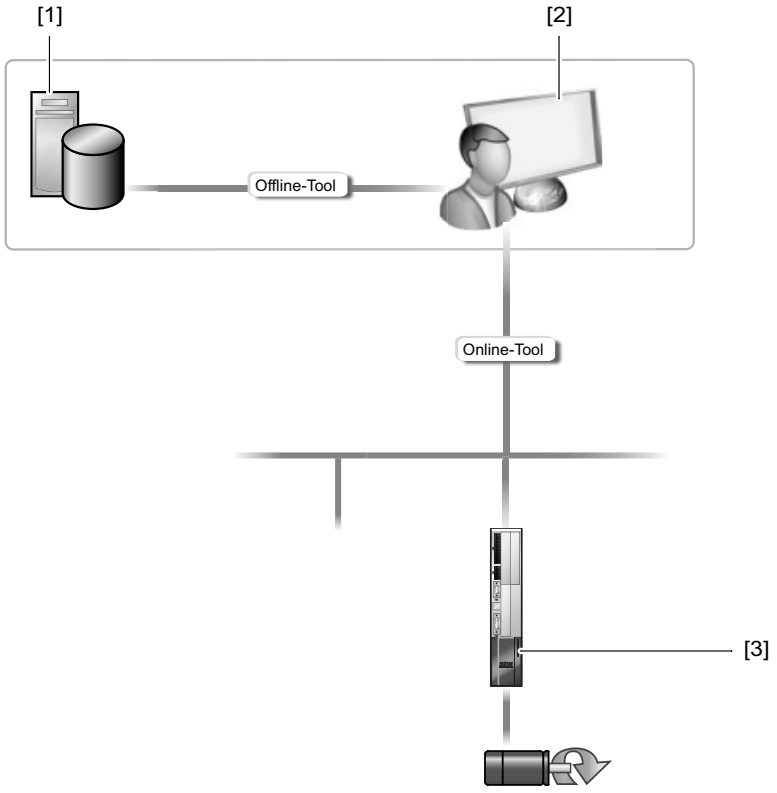
10.3 Communication mode

10.3.1 Overview

MOVITOOLS® MotionStudio differentiates between the "online" and "offline" communication mode.

You determine the communication mode. Depending on the selected communication mode, you can choose offline or online tools specific to your unit.

The following figure illustrates the two types of tools:



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Tools	Description
Offline tools	Changes made using offline tools affect **"ONLY"** the working memory [2]. • Save your project so that the changes can be stored on the hard disk [1] of your PC. • By downloading, you can transfer the changes to your unit [3].
Online tools	Changes made using online tools affect **"ONLY"** the unit [3]. • By uploading, you can transfer the changes to the working memory [2]. • Save your project so that the changes can be stored on the hard disk [1] of your PC.

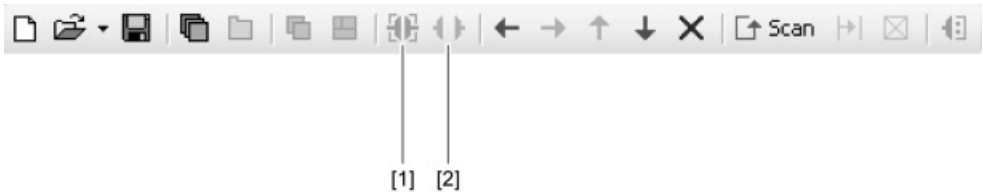
	TIP
	The online communication mode is **NOT** a response message which informs you that you are currently connected to the unit or that your unit is ready for communication. • If you need this response message, pay attention to the section "Setting up the cyclic availability test" in the online help (or in the manual) of MOVITOOLS® MotionStudio.

	TIP
	• Project management commands (such as "download" and "upload"), the online unit status, and the "unit scan" operate independently of the set communication mode. • MOVITOOLS® MotionStudio starts up in the communication mode that you set before you closed down.

10.3.2 Selecting communication mode (online or offline)

Proceed as follows to select a communication mode:

1. Select the communication mode:
   - "Online" [1] for functions (online tools) that should directly influence the unit.
   - "Offline" [2] for functions (offline tools) that should influence your project.



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2. Select the unit node.
3. Open the context menu by clicking the right mouse button and display the tools for configuring the unit.

10.4 Serial communication (RS485) via interface adapters

10.4.1 Engineering via interface adapters (serial)

Since your unit supports the "serial" communication option, you can use a suitable interface adapter for engineering.

The interface adapter is additional hardware that you can obtain from SEW-EURODRIVE. You can use it to connect your engineering PC with the respective communication option of the unit.

The following table shows you the different types of interface adapters available, and for which units they are suitable.

Type of interface adapter (option)	Purchase order number	Scope of delivery	Units
USB11A (USB to RS485)	08248311	Two connection cables: • TAE connection cable with two RJ10 connectors • USB connection cable with a USB-A and USB-B connector	• MOVIDRIVE® B • MOVITRAC® 07A • MOVITRAC® B • MOVIFIT® MC/FC/SC • MOVIGEAR® • UFx11A fieldbus gateways • DFx fieldbus gateways • DHx MOVI-PLC® control • MFx/MQx fieldbus interfaces for MOVIMOT®
UWS21B (RS232 to RS485)	18204562	Two connection cables: • TAE connection cable with two RJ10 connectors • Connection cable with 9-pin sub-D connector	
UWS11A (RS232 to RS485) for mounting rail	822689X	without	

Since most PCs are now equipped with USB interfaces instead of RS232 interfaces, the following chapters only deal with the USB11A interface adapter.

10.4.2 Starting up the USB11A interface adapter

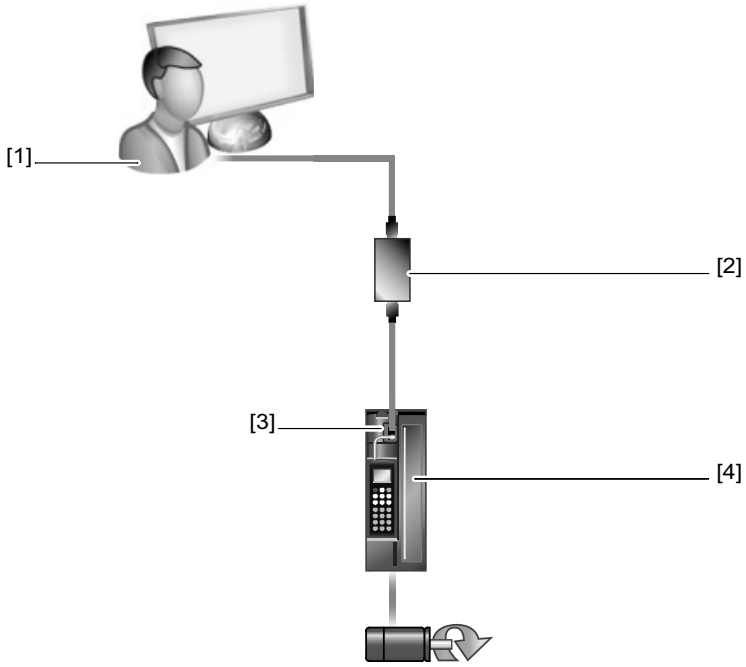
Overview

The USB11A interface adapter operates with a COM redirector. This assigns the first free COM port to the interface adapter.

The following describes how to connect the USB11A interface adapter to your unit and, if necessary, how to install the driver.

Connecting the USB11A to the unit

The following figure shows how the USB11A interface adapter [2] is connected with the unit [4] and with the PC [1] via the diagnostic slot [3].



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[1] PC
[2] USB11A with two connection cables (included in the scope of delivery)
[3] Diagnostic slot of the unit
[4] MOVIDRIVE® B or gateway DFE33B / UOH11B

To connect the USB11A interface adapter with the PC and your unit, proceed as follows:

1. Connect the USB11A interface adapter [2] with the two connection cables provided.
2. Plug the RJ10 connector of the first connection cable into the diagnostic slot [3] XT (MOVIDRIVE® B) or X24 (gateway DFE33B / UOH11B) [4].
3. Plug the USB-**A** connector of the second connection cable into the free USB interface on your PC [1].
4. If you are operating the interface adapter with MOVITOOLS® MotionStudio for the first time, install the required driver.

The drivers for the USB11A interface adapter are installed during installation of MOVITOOLS® MotionStudio. This also applies to the driver for the COM redirector. A prerequisite for this is that the interface adapter must be connected to your PC while installing MOVITOOLS® MotionStudio.

If you wish to use the USB11A interface adapter afterwards you will find all required driver files in the installation path of MOVITOOLS® MotionStudio.

To install the driver for the USB11A interface adapter **afterwards**, proceed as follows:

1. Make sure that you have local administrator rights on your PC.
2. Connect the USB11A interface adapter to a free USB connection on your PC.

   Your PC will detect the new hardware and launch the hardware wizard.
3. Follow the instructions of the hardware wizard.
4. Click the [Browse] button and change to the installation directory of MOVITOOLS® MotionStudio.
5. Enter the following path:

   "..\Program Files\SEW\MotionStudo\Driver\FTDI_V2"
6. Click the [Next] button to install the driver and assign the first free COM port of the PC to the interface adapter.

Check the COM port of the USB11A on the PC

To check which virtual COM port of the PC was assigned to the USB11A interface adapter, proceed as follows:

1. Select the following menu item on your PC:

   [Start] / [Settings] / [Control Panel] / [System]
2. Open the "Hardware" tab page.
3. Click the [Unit manager] button.
4. Expand the directory "Connections (COM and LPT)".

   This displays which virtual COM port was assigned to the interface adapter, for example: "USB serial port (COM3)".

	TIP
	Change the COM port of the USB11A to avoid conflict with other COM ports. It is possible that a different hardware (such as an internal modem) is assigned the same COM port as the USB11A interface adapter. • Select the COM port of the USB11A in the unit manager. • In the context menu, click the [Properties] button and assign the USB11A a different COM port. • Restart the PC so the changed properties are accepted.

10.4.3 Configuring serial communication

You must have a serial connection between your PC and the units you want to configure. You can establish one, for example, using the USB11A interface adapter.

Proceed as follows to configure serial communication:

1. Press the button [Configure communication plugs] [1] located in the toolbar.

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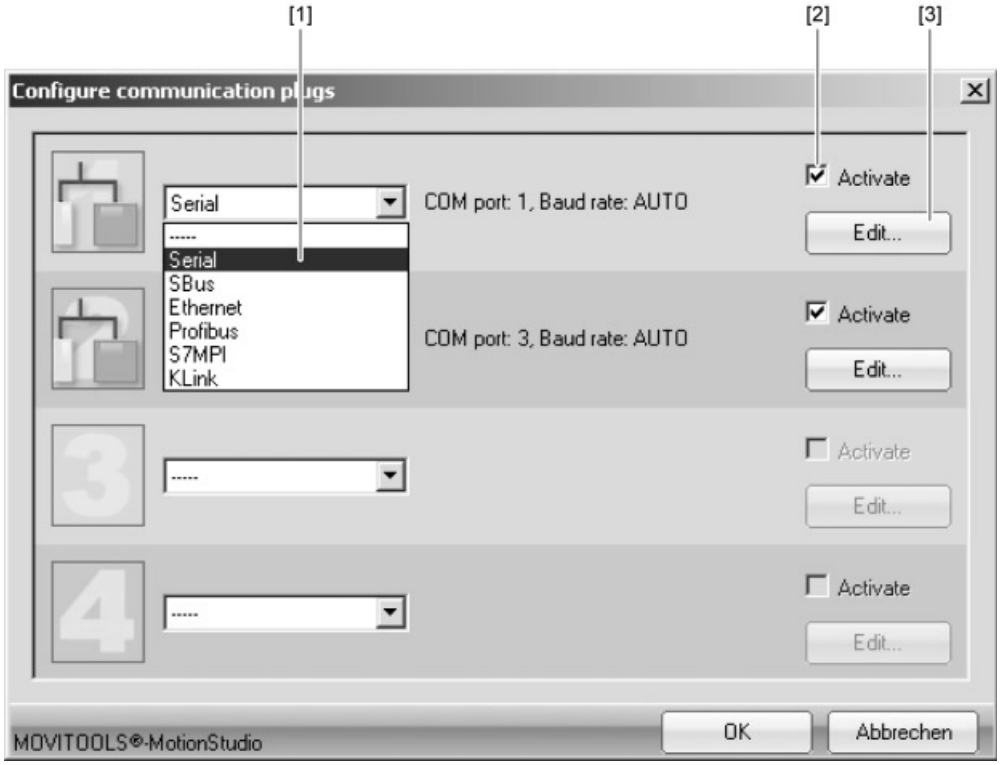
This opens the "Configure communication plugs" window.



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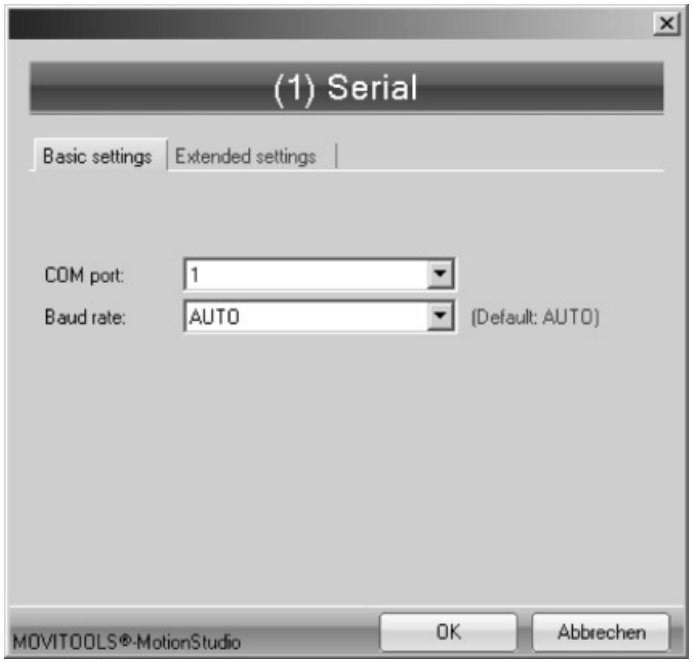
2. From the list [1], select "Serial" as the communication type.

   In the example, "Serial" is activated as the communication type for the first communication channel [2].

3. Press the [Edit] button [3] on the right side of the "Configure communication plugs" window.

   This will display the settings for the "serial" communication type.



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4. If necessary, change the preset communication parameters on the tab pages [Basic settings] and [Extended settings]. When doing so, refer to the detailed description of the communication parameters (page 117).

10.4.4 Serial communication parameter (RS485)

The following table describes the [Basic setting] for the serial (RS485) communication channel:

Communication parameter	Description	Tip
COM port	Serial port connected to the interface adapter	• If there is no value entered here, the SEW Communication Server uses the first available port. • A USB interface adapter is indicated by the addition of "(USB)".

Baud rate	Transmission speed with which the connected PC communicates with the unit in the network via the communication channel.	• Possible values:
		  • 9.6 kBit/s
		  • 57.6 kBit/s
		  • AUTO (default setting)
		• Find the correct value for the connected unit in the documentation.
		• If you set "AUTO", the units are scanned with both baud rates in succession.
		• Set the starting value for automatic baud rate detection under [Settings] / [Options] / [Communication].

The following table describes the [Extended setting] for the serial (RS485) communication channel:

Communication parameter	Description	Tip
Parameter telegrams	Telegram with a single parameter	Used to transfer a **single parameter** of a unit.
Multibyte telegrams	Telegram with several parameters	Used to transfer the **complete** parameter set of a unit.

Timeout	Waiting time in [ms] that the master waits for a reply from a slave after it has sent a request	• Default setting:
		  • 100 ms (parameter telegram)
		  • 350 ms (multibyte telegram)
		• Increase the value if all units are not found during a network scan.

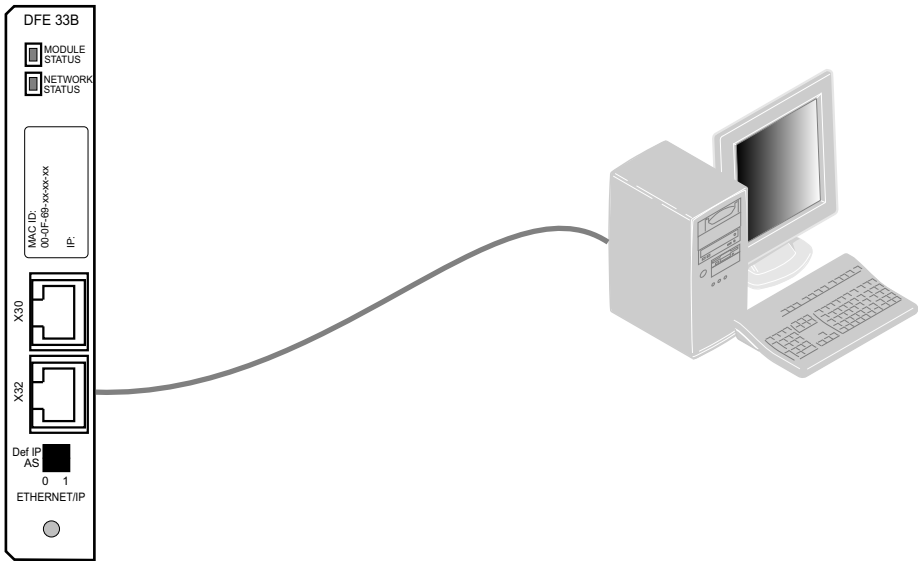
Retries	Number of request retries after the timeout is exceeded	Default setting: 3

10.5 Communication via Ethernet

10.5.1 Connecting the unit with the PC via Ethernet

Connecting the Ethernet interface of DFE33B to the PC

The following figure shows the connection between the PC/laptop and the DFE33B.



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The DFE33B can be directly connected to the PC or via an Ethernet network. The two Ethernet interfaces (X30, X32) of the DFE33B allow for a linear bus structure.

The DFE33B offers auto-crossing and autonegotiation for the baud rate and duplex mode using both interfaces.

10.5.2 Address Editor

Overview

Address Editor is a free software tool from SEW-EURODRIVE. It is available once MOVITOOLS® MotionStudio has been installed.

You can use Address Editor to establish communication with your units via Ethernet and to address the units.

If you connect the Ethernet interface of your engineering PC to the Ethernet via a patch cable, Address Editor detects all Ethernet stations in the connected network segment (local power supply).

In contrast to "MOVITOOLS® MotionStudio", you do **not** need to set the IP address of the engineering PC to the local network.

For this reason, Address Editor is a practical addition to "MOVITOOLS® MotionStudio".

If you have added other Ethernet stations to an existing network, proceed as follows:

- Start Address Editor
- Search for Ethernet stations

Once you have located the added Ethernet stations, continue using one of the following options:

- Set the located Ethernet stations appropriately for the network (addressing)
- Set the engineering PC appropriately for the network

Start Address Editor

You can use Address Editor immediately after installing MOVITOOLS® MotionStudio.

Proceed as follows to start Address Editor:

1. Close MOVITOOLS® MotionStudio.
2. Start Address Editor in the WINDOWS start menu by following the path below: "Start\Program\SEW\MOVITOOLS MotionStudio\Address Editor (Address Tool)"

Searching for Ethernet stations

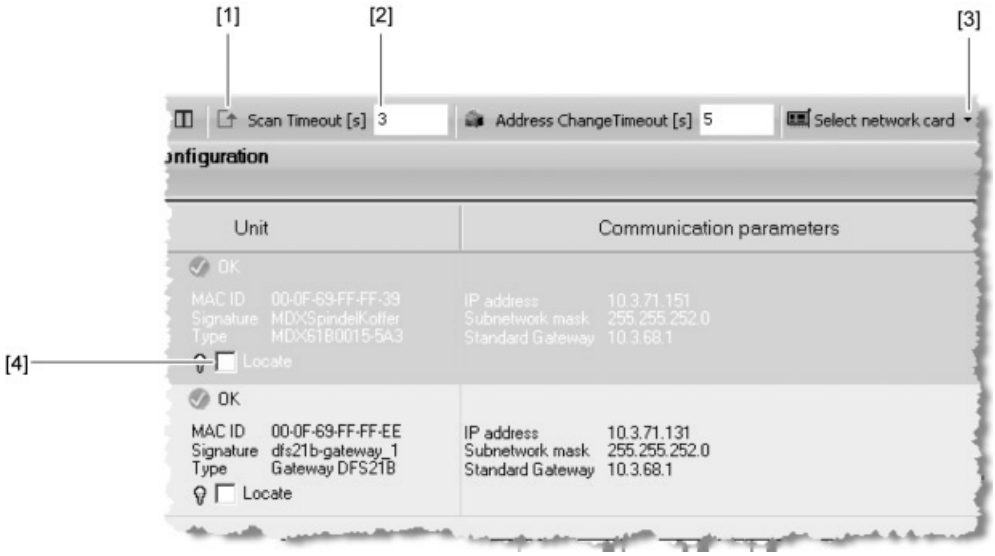
You can use Address Editor to search for Ethernet stations in a network. You can also use it to locate newly added Ethernet stations. Address Editor also helps you locate the Ethernet interface of the Ethernet stations that were found.

To search for Ethernet stations and locate hardware, proceed as follows:

1. Select "Ethernet" as the interface for the unit and PC. To do so, select the relevant checkbox in the lower section of the window.
2. Click [Next] to confirm your selection and to get to the next dialog.
3. Wait until the network scan starts **automatically**. The default setting for the waiting time (scan timeout) is 3 seconds [2]

   You can also start the network scan **manually** as follows:

   - If you have several network cards installed in your PC, select the desired card. To do so, click the "Select network card" symbol [3] in the toolbar.
   - Click the "Start network scan" symbol [1] in the toolbar.



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[1] "Start network scan" symbol
[2] "Scan timeout" input field
[3] "Select network card" symbol
[4] "Locate" checkbox

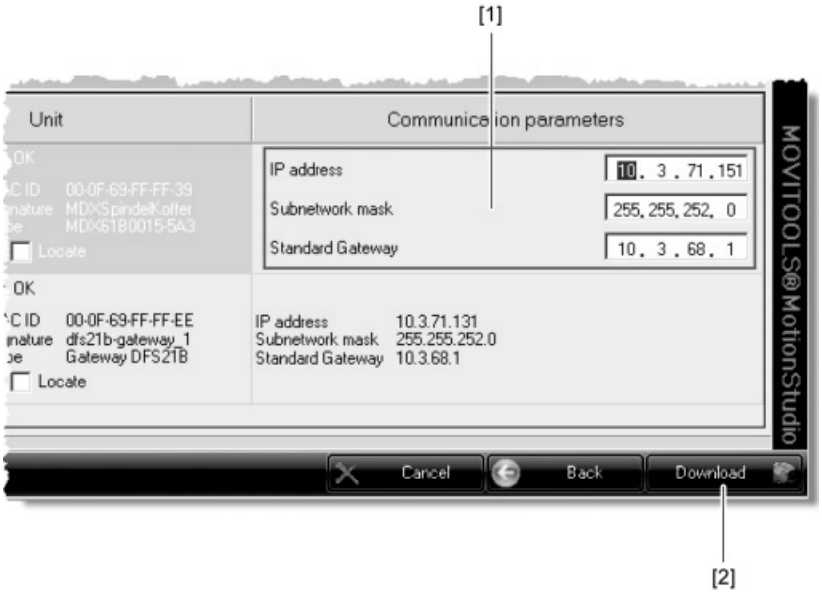
This lists the current addressing of all Ethernet stations in the connected network.

4. To locate an Ethernet station, select the "Locate" checkbox [4]. As a result, the Link/Activity LED of the first Ethernet interface of the relevant Ethernet station flashes.

Set the located Ethernet stations appropriately for the network (addressing)

To set the located Ethernet stations appropriately for the network (addressing), proceed as follows:

1. To set the IP parameters of an Ethernet station appropriately for the network, double-click "Communication parameters" in the window area of the respective unit [1].



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[1] "Communication parameters" window area
[2] "Download" button

The following fields can then be edited:

- IP address of the Ethernet station
- IP address of the subnetwork mask
- IP address of the standard gateway
- DHCP startup configuration (if the unit supports it)

2. Transfer the changes in addressing to the Ethernet station. Click the [Download] button [2] to do so.
3. Switch the unit off and back on again so the modified settings become effective.

Set the engineering PC appropriately for the network (addressing)

To set the engineering PC appropriately for the network (addressing), proceed as follows:

1. Under [Start] / [Settings] / [Network and Dial-up Connections], select the PC interface you require.
2. Select "Properties" from the context menu.
3. Activate the checkbox by entering "Internet protocol (TCP/IP)".
4. Click the "Properties" button.
5. For the subnetwork mask and standard gateway, enter the same IP addresses that are used for other Ethernet stations in this local network.
6. For the engineering PC, enter an IP address that meets the following conditions:
   - In the blocks that define the **network**, the address section of the engineering PC must correspond with the address section of the other Ethernet stations.
   - In the blocks that define the **station**, the address section of the engineering PC must be different from the address section of the other Ethernet stations.
   - Do not assign the values "0", "4", "127" and "225" to the last block.

TIP

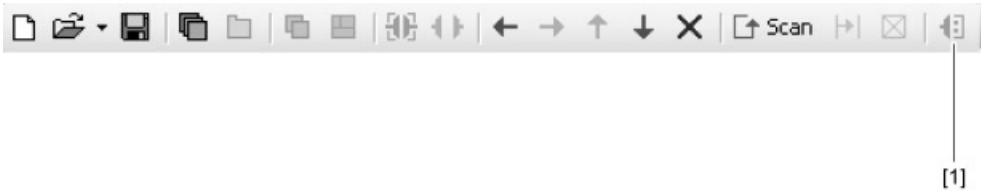
In the IP address of the subnetwork mask (such as 255.255.255.0), the values in the blocks have the following meaning:

- "255" defines the address of the network where the stations are located.
- "0" defines the address of the actual station to differentiate it from the others.

10.5.3 Configuring the communication channel via Ethernet

To configure a communication channel for the Ethernet, proceed as follows:

1. Press the button [Configure communication plugs] [1] located in the toolbar.



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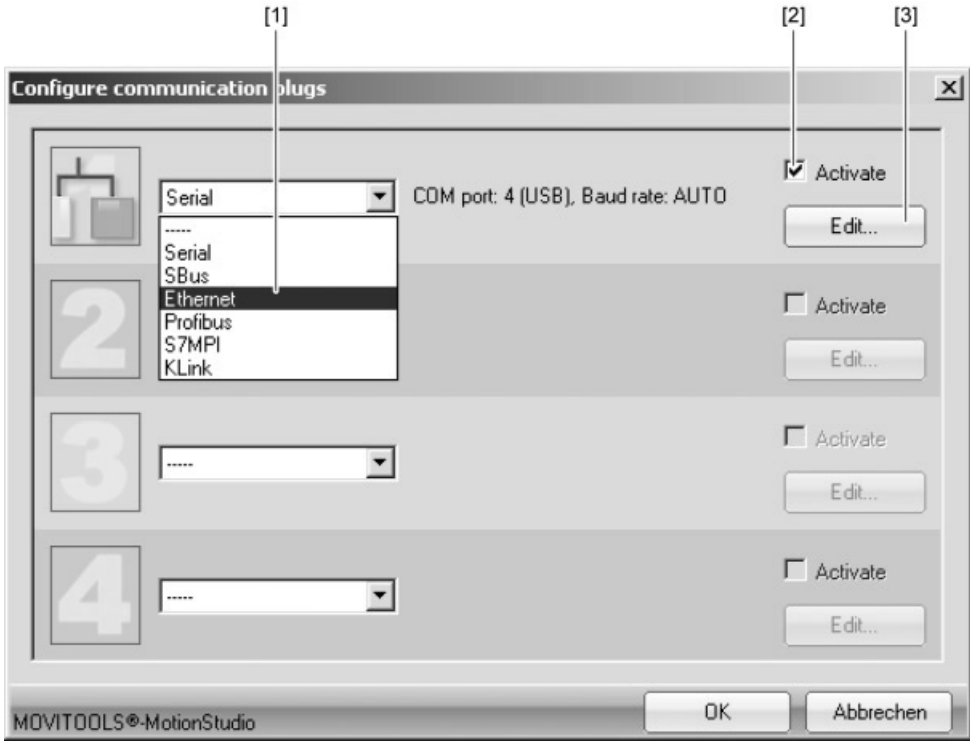
2. This opens the "Configure communication plugs" window. From the list [1], select "Ethernet" as the communication type. In the example, "Ethernet" is activated as the communication type for the first communication channel [2].



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3. Press the [Edit] button [3] in the right section of the window. This displays the settings for the communication type "Ethernet".
4. Set up the SMLP protocol. To do so, select the "SMLP settings" tab.
5. Set up the parameters. Follow the instructions described in the section "Setting parameters for SMLP".

	TIP
	SMLP stands for **S**imple **M**OVI**L**INK® **P**rotocol. It is the unit protocol from SEW-EURODRIVE.

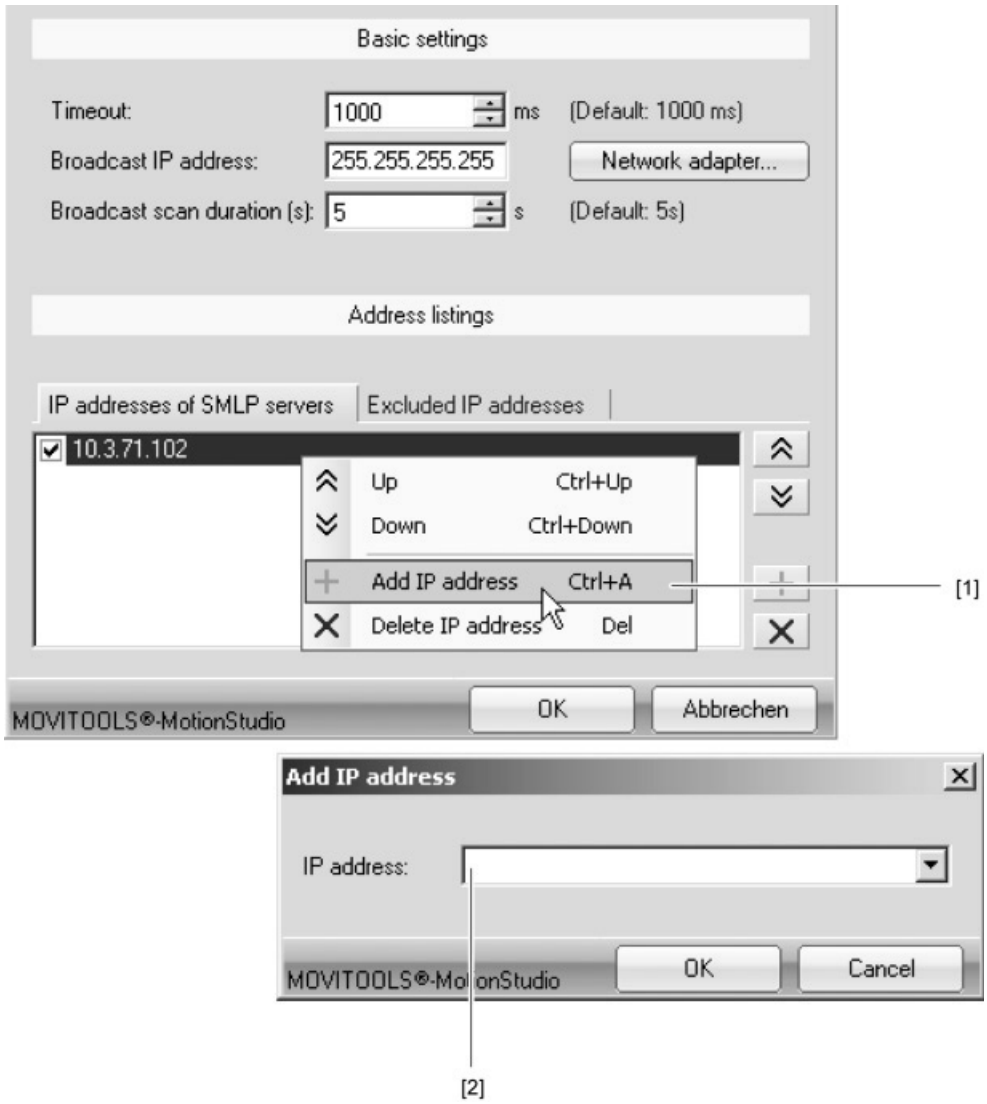
10.5.4 Setting the communication parameters for SMLP

To set up communication parameters for communicating via Ethernet, proceed as follows:

1. If necessary, change the preset communication parameters. When doing so, refer to the detailed description of the communication parameters for SMLP.

	TIP
	During a unit scan, the system recognizes only units that are in the same (local) network segment as the PC that is running MOVITOOLS® MotionStudio. • If you have units that are **OUTSIDE** the local network segment, add the IP addresses of these units to the list of SMLP servers.

2. Add an IP address by opening the context menu and selecting [Add IP address] [1].



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3. Add the IP address [2].

10.5.5 Communication parameters for SMLP

The following table describes the communication parameters for SMLP:

Communication parameter	Description	Tip
Timeout	Waiting time in [ms] that the client waits for a reply from the server after it has made a request.	• Default setting: 1000 ms • Increase the value as required if a delay in communication is causing malfunctions.
Broadcast IP address	IP address of the local network segment **within** which the unit scan is carried out.	In the default setting, the unit scan retrieves units that are in the local network segment only.
SMLP server IP address	IP addresses of the SMLP server or of other units that are to be included in the unit scan but are **outside** the local network segment.	• Enter the IP address of units that are to be included in the unit scan but are **outside** the local network segment.
Excluded IP address	IP addresses of units that are **not** to be included in the unit scan.	Enter the IP address of units that are **not** to be included in the unit scan. These may be units that are not ready for communication (for example because they have not yet been started up).

10.6 Executing functions with the units

10.6.1 Parameter setting for units in the parameter tree

The parameter tree displays all unit parameters, grouped into folders.

You can manage unit parameters with the context menu or the toolbar. The following section describes how to read or change unit parameters.

10.6.2 Reading/changing unit parameters

To read or change unit parameters, proceed as follows:

1. Switch to a view (project view or network view).
2. Select the communication mode:
   - Press the [Switch to online mode] button [1] if you would like to read or change parameters directly on the **unit**.
   - Press the [Switch to offline mode] button [2] if you would like to read or change parameters in the **project**.

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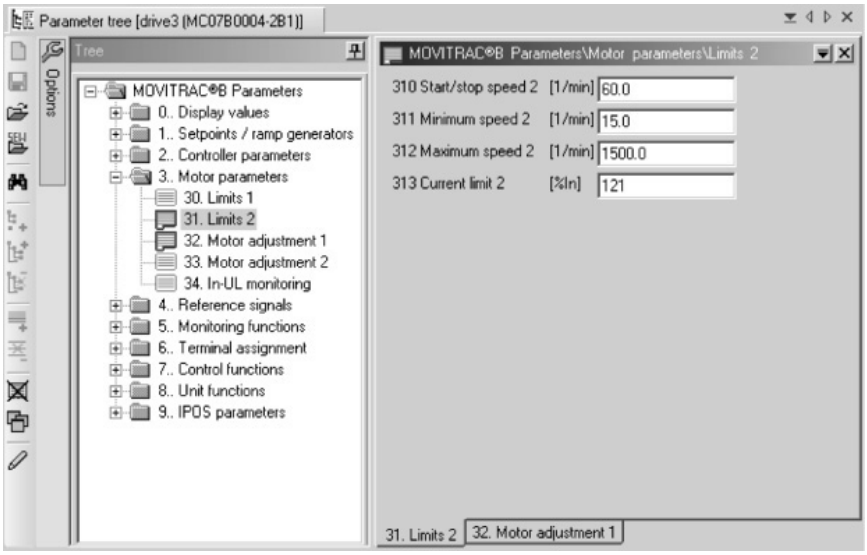
3. Select the unit you want to configure.
4. Open the context menu and select the [Parameter tree] command.

   This opens the "Parameter tree" view on the right section of the screen.
5. Expand the "Parameter tree" up to the node you require.



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6. Double-click to display a particular group of unit parameters.
7. Press the enter key to finalize any changes you make to numerical values in the input fields.

10.6.3 Starting up the units (online)

Proceed as follows to start up the units (online):

1. Switch to the network view.
2. Press the [Switch to online mode] button [1].

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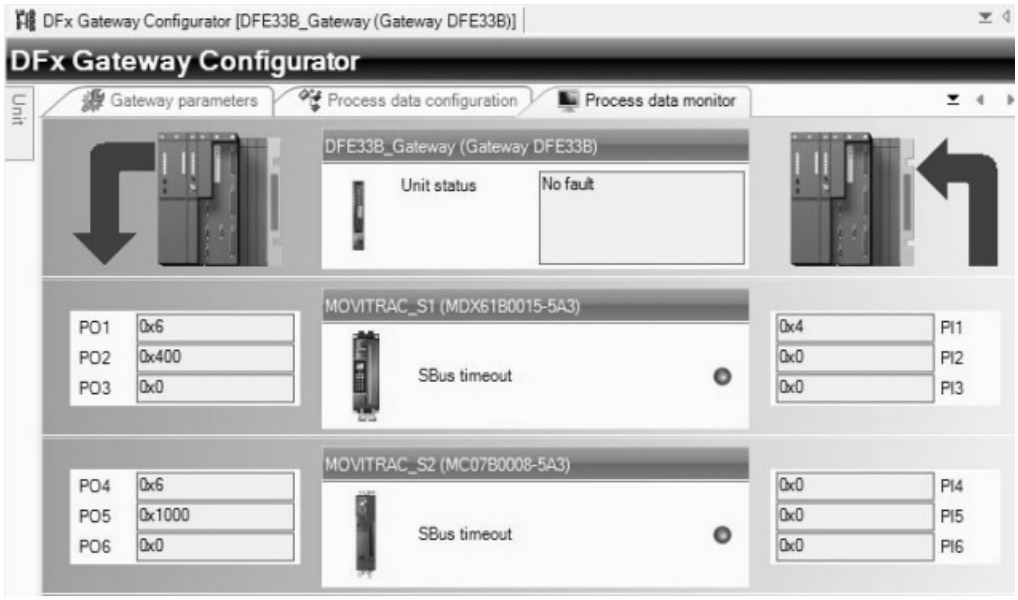
3. Select the unit you want to startup.
4. Open the context menu and select the command [Startup] / [Startup].
   This opens the startup wizard.
5. Follow the instructions of the startup wizard and then load the startup data onto your unit.

	TIP
	• For detailed information about the unit parameters, refer to parameter list for the unit. • For detailed information about using the startup wizard, see the MOVITOOLS® MotionStudio online help.

10.6.4 Special configuration and diagnostics tools

To configure the DFE33B in gateway operation, you can use the context menu to start both the "DFx gateway configurator" and the parameter tree. In addition to configuration, this function provides information for diagnostics of gateway operation and displays the transferred process data.



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11 Ethernet Configuration Parameters

11.1 Parameter description

The parameter group P78x includes display and setting values that are specific to the DFE33B option.

	TIPS
	As the DHCP is activated in the DFE33B option in delivery state, the following parameters are given values assigned by the DHCP server: • P780 IP address • P781 Subnetwork mask • P782 Standard gateway Any changes made to the above parameters are only adopted when the DHCP (P785) is deactivated **before** the unit is switched off and then on again. If the DIP switch "Def IP" is set to "1" when switching on the DFE33B option, the specified default values of parameters P780 to P782 are active.

P780 IP address

Setting range: 0.0.0.0 – 223.255.255.255

Factory setting: 0.0.0.0

Default value: 192.168.10.4

Use P780 to set the IP address for linking the DFE33B option via Ethernet. If DHCP (P785) is activated, the value specified by the DHCP server will be displayed.

P781 Subnetwork mask

Setting range: 0.0.0.0 – 255.255.255.255

Factory setting: 0.0.0.0

Default value: 255.255.255.0

The subnetwork mask divides the network into subnetworks. The set bits determine which part of the IP address represents the address of the subnetwork. If the DHCP (P785) is activated, the value specified by the DHCP server will be displayed here.

P782 Standard gateway

Setting range: 0.0.0.0 – 223.255.255.255

Factory setting: 0.0.0.0

Default value: 1.0.0.0

The standard gateway is addressed if the desired communication partner is not within the actual network. The standard gateway will have to be part of the actual network. If DHCP (P785) is activated, the value specified by the DHCP server will be displayed.

P783 Baud rate

Display value that cannot be changed. The value 100 MBaud is displayed after the initialization phase. This is the baud rate between the internal switch and bus electronics, not the baud rate at X30 or X32.

P784 MAC ID

Display value that cannot be changed. Displays the MAC ID; that is, the unique Ethernet address of the interface module. The MAC ID of Ethernet components from SEW-EURODRIVE has the identification "00-0F-69" in the first three bytes.

P785 DHCP / Startup configuration

Setting range: 0 (saved IP parameter) / 2 (DHCP)

Factory setting: 2 (DHCP)

DHCP: The DFE33B option is assigned its IP parameters (P780 ... P782) by a DHCP server when the supply voltage is switched on.

Saved IP parameters: The DFE33B option is started with the saved IP parameters when the supply voltage is switched on.

12 Troubleshooting

12.1 Diagnostic sequence

The diagnostic procedures described in the following section demonstrate the integration of the DFE33B option into an Ethernet network and the error analysis method for the following problems:

- Inverter is not integrated properly in the EtherNet/IP or Modbus/TCP network
- Inverter cannot be controlled using the master (scanner)

For more information dealing specifically with the inverter parameter settings for various fieldbus applications, refer to the *Fieldbus Unit Profile* manual and the *MOVIDRIVE® parameter list*.

For more diagnostic information, refer to the online status display in the EtherNet/IP master (scanner), in the Modbus/TCP master and the associated online help.

Step 1: Check the status LEDs of the DFE33B

The explanation of the different LEDs can be found in section 4. The following table shows the corresponding unit states and their causes. An "X" indicates that the state of the respective LED is not relevant.

LED			
MODULE STATUS	**NETWORK STATUS**	**Operating state**	**Cause**
Off	Off	Off	No power supply via MOVIDRIVE® B or X26 if DFE33B is installed in MOVITRAC® B or gateway housing.
Red	Red	Reset	DFE33B in reset status
Red	X	Fault	DFE33B has an internal error
Flashing green	Off	IP stack starting	If DHCP is active, the DFE33B remains in this state until assigned an IP address.
Flashing red	Red	IP conflict	Conflict with the IP address if the same IP address is used by another station in the network.
Flashing green/red	Flashing green/red	LED test	All LED conditions are briefly activated.
Flashing green	Flashing green	Application starting	All functions of the DFE33B (e. g. Auto Setup and connections to the master) are now active.
Green	Flashing green	Operational	The DFE33B is active on the fieldbus but without a controlling connection to the master.
Green	Green	Connected	There is a controlling connection with a master.
Green	Flashing red	Timeout	A previous controlling connection is in timeout status.

To check and set the IP parameters, follow the instructions in the section "Setting the IP address parameters" or use MOVITOOLS® MotionStudio.

The PC commands PING and IPCONFIG can also be used to check communication via Ethernet. They can be executed via the command prompt (Dos Box) of the PC.

Step 2: Check the status LED and the status display of the master (scanner)

To do so, use the documentation of the controller or master module.

Step 3: Troubleshooting

If DFE33B is in the "Connected" status, data exchange between master (scanner) and slave (DFE33B) is active. If it is still impossible to control the drive via EtherNet/IP or Modbus/TCP, the following questions should help in finding the cause of the error.

A. Are the correct values for the process data words displayed in MOVITOOLS® MotionStudio? Parameter group 09 (MOVIDRIVE® B) or process data (gateway).

   If yes, proceed with F.

B. Do the bus master and controller cyclically exchange data?

C. Is the process data written on the correct point of the master (scanner)? Check the tags and mapping.

D. Is the PLC in RUN mode or does active forcing overwrite the transfer of the normal process data?

E. If the PLC is not sending data to the DFE33B, refer to the documentation of the PLC manufacturer for support.

F. Is the DFE33B option installed in MOVITRAC® B or in the gateway housing?

   If yes, proceed with H.

G. In MOVIDRIVE® B, are *P100 control source* and *P101 setpoint source* = FIELDBUS?

   Proceed with L.

H. Can all drives on the SBus of the gateway be addressed by MOVITOOLS® MotionStudio via Ethernet or the serial interface X24 of the gateway?

   Check SBus addresses and SBus baud rate.

I. Is LED H1 on the gateway off?

J. Has the Auto Setup function (DIP switch AS) been executed with all drives connected to the SBus and supplied with power?

K. In MOVITRAC® B connected to the gateway, are *P100 control source* and *P101 setpoint source* = SBus 1?

L. Are the process data words in the drive configured correctly (P870 ... P875)?

M. Is process output data enabled (P876) = ON?

N. Is the wiring of the binary inputs disabling the operation?

   Check parameter group P03_ and P04_.

O. Is an error active? What is the unit status?

P. Is an IPOS$^{plus®}$ program active, which, for example, affects the inverter status?

12.2 Error list in gateway operation

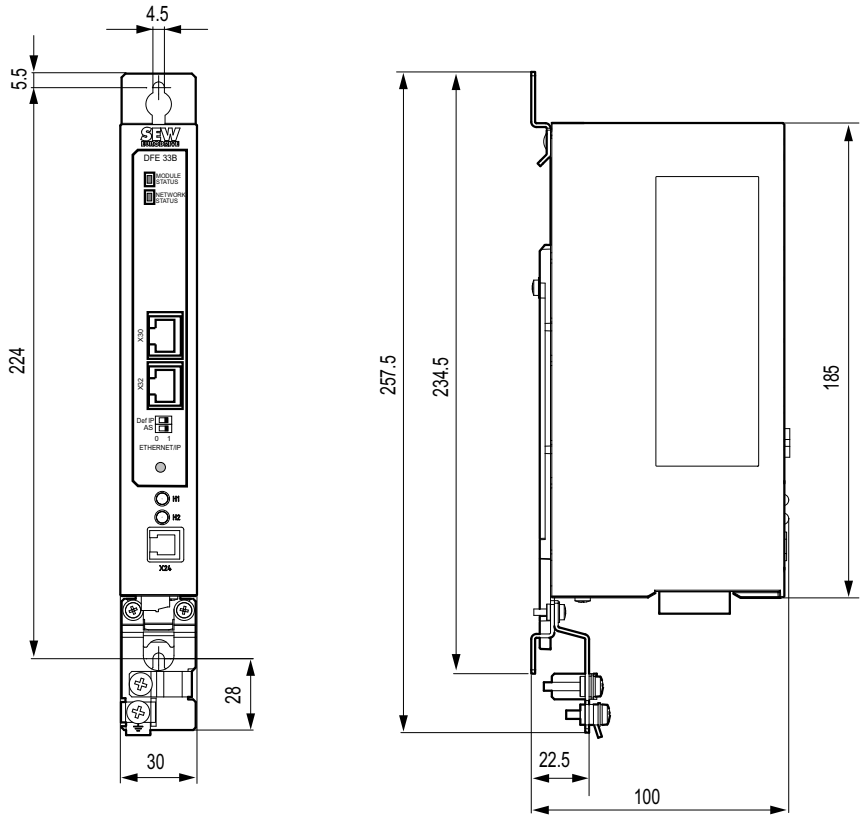
Fault code	Designation	Response	Cause	Measure
25	EEPROM	SBus communication stopped	Fault while accessing EEPROM	Activate factory settings, perform reset and reconfigure DFE. Contact SEW service if the error occurs again
28	Fieldbus timeout	Default: PO data = 0 Error response adjustable via P831	No communication between master and slave within the projected response monitoring.	• Check communication routine of the master • Extend the fieldbus timeout interval (response monitoring) in the master configuration or deactivate monitoring
37	Watchdog error	SBus communication stopped	Error during execution of system software	Contact SEW Service.
38	Internal error	SBus communication stopped	Inverter electronics is faulty, possibly due to EMC influence	Check grounding and shielding and improve, if necessary. Consult SEW service if the error occurs again.
45	Initialization fault	SBus communication stopped	Error after self-test during reset	Perform a reset. Consult SEW service if the error occurs again.
111	System error device timeout	None	Check the red system error LED (**H1**) of the DFE. If this LED is on, one or several stations on the SBus could not be addressed within the timeout interval. If the red system error LED (**H1**) flashes, the DFE itself is in fault state. In this case, error F111 is reported to the control via fieldbus in status word 1 and 3 of the relevant unit.	Check voltage supply and SBus cabling, check SBus terminating resistors. Check the project planning if the DFE was configured with the PC. Switch DFE off and on again. If the error is still present, query the error via diagnostic interface and perform the action described in this table.

13 Technical Data

13.1 DFE33B option for MOVIDRIVE® B

DFE33B option	
Part number	1821 346 4
Power consumption	P = 3 W
Application protocol	• **EtherNet/IP** (Ethernet Industrial Protocol) or **Modbus/TCP** to control and set parameters for the inverter. • **HTTP** (Hypertext Transfer Protocol) for diagnostics using a Web browser. • **SMLP** (Simple Movilink Protocol), protocol used by MOVITOOLS®. • **DHCP** (Dynamic Host Configuration Protocol) to assign address parameter automatically.
Port numbers used	• 44818 EtherNet/IP (TCP) • 2222 EtherNet/IP (UDP) • 502 Modbus/TCP • 300 SMLP (TCP, UDP) • 80 HTTP • 67 / 68 DHCP
Ethernet services	• ARP • ICMP (Ping)
ISO / OSI layer 1/2 **ISO / OSI layer 4/5**	Ethernet II TCP/IP and UDP/IP
Automatic baud rate detection	10 MBaud / 100 MBaud
Connection technology	2 x RJ45 with integrated switch and auto-crossing
Addressing	4 byte IP address or MAC-ID (00-0F-69-xx-xx-xx)
Manufacturer ID (vendor ID)	• 013Bhex (EtherNet/IP) • "SEW-EURODRIVE" (Modbus/TCP)
Tools for startup	• MOVITOOLS® MotionStudio software package, version 5.40 and higher • DBG60B keypad
Firmware version of MOVIDRIVE® MDX61B	Firmware version 824 854 0.17 or higher (→ Display with P076)

13.2 Dimension drawing of DFE33B option for MOVITRAC® B and in the gateway housing



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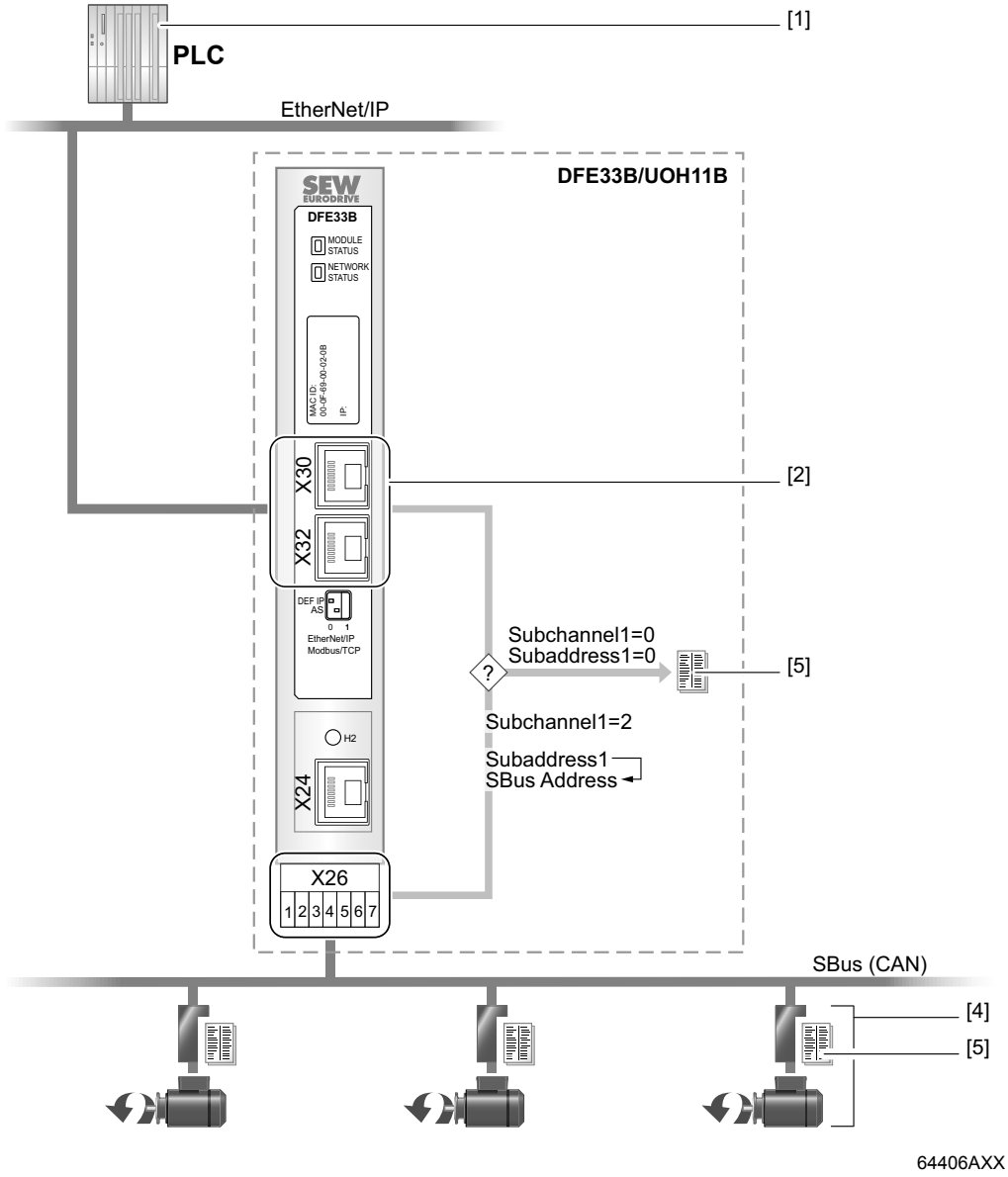
DFE33B option (MOVITRAC® B gateway)	
External voltage supply	U = DC 24 V (–15 % / +20 %) I_{max} = DC 200 mA P_{max} = 3.4 W
Application protocol	• **EtherNet/IP** (Industrial Protocol) or **Modbus/TCP** to control and set parameters for the inverter. • **HTTP** (Hypertext Transfer Protocol) for diagnostics using a Web browser. • **SMLP** (Simple Movilink Protocol), protocol used by MOVITOOLS®. • **DHCP** (Dynamic Host Configuration Protocol) to assign address parameter automatically.
Port numbers used	• 44818 EtherNet/IP (TCP) • 2222 EtherNet/IP (UDP) • 502 Modbus/TCP • 300 SMLP (TCP, UDP) • 80 HTTP • 67 / 68 DHCP
Ethernet services	• ARP • ICMP (Ping)
ISO / OSI layer 1/2 **ISO / OSI layer 4/5**	Ethernet II TCP/IP and UDP/IP
Automatic baud rate detection	10 MBaud / 100 MBaud
Connection technology	2 x RJ45 with integrated switch and auto-crossing
Addressing	4 byte IP address or MAC-ID (00-0F-69-xx-xx-xx)
Manufacturer ID	• 013Bhex (EtherNet/IP) • "SEW-EURODRIVE" (Modbus/TCP)
Tools for startup	MOVITOOLS® MotionStudio software package, version 5.40 and higher
Firmware version of MOVITRAC® B	No special firmware is required

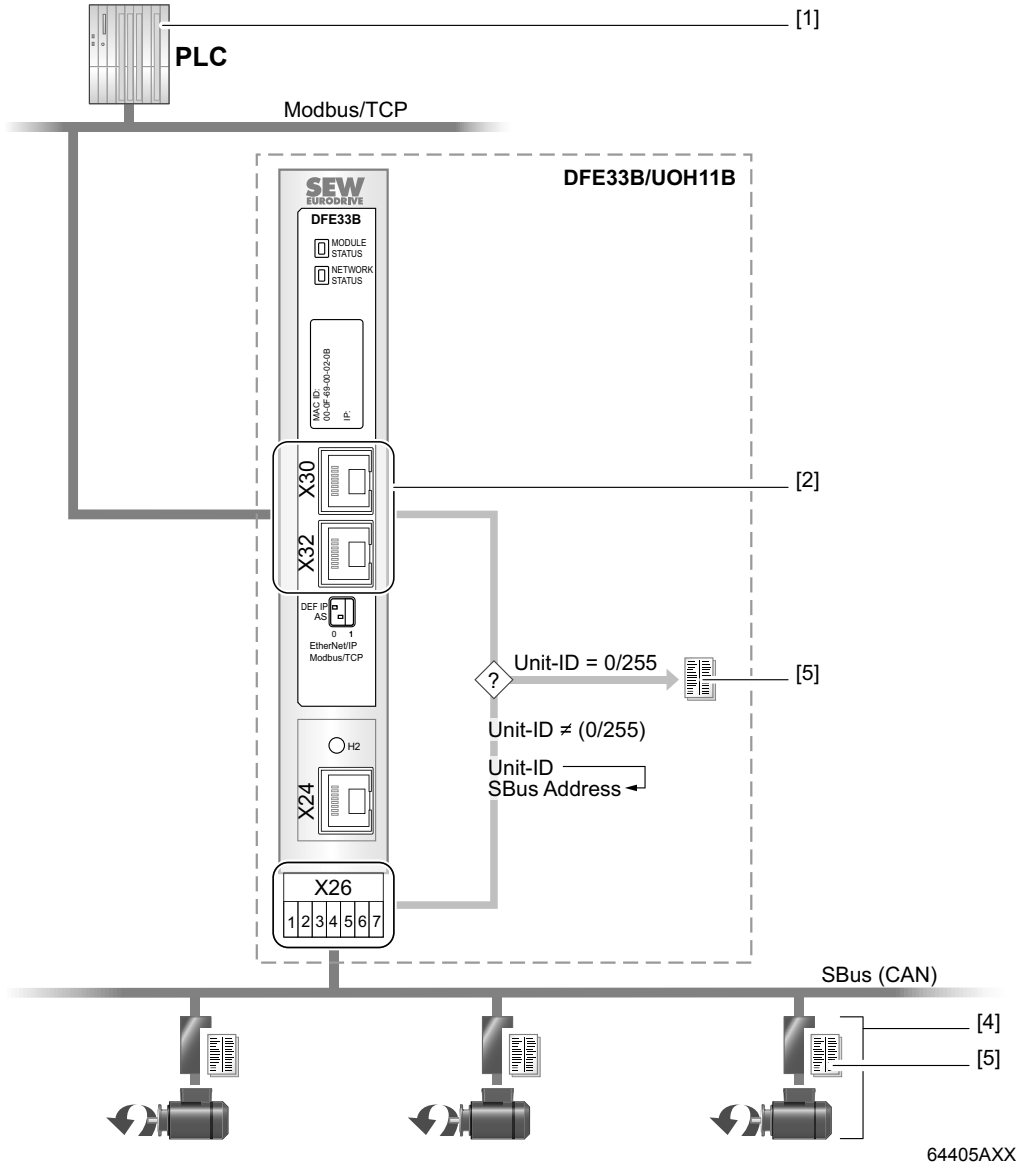
14 Appendix

14.1 Parameter access to lower-level units via EtherNet/IP



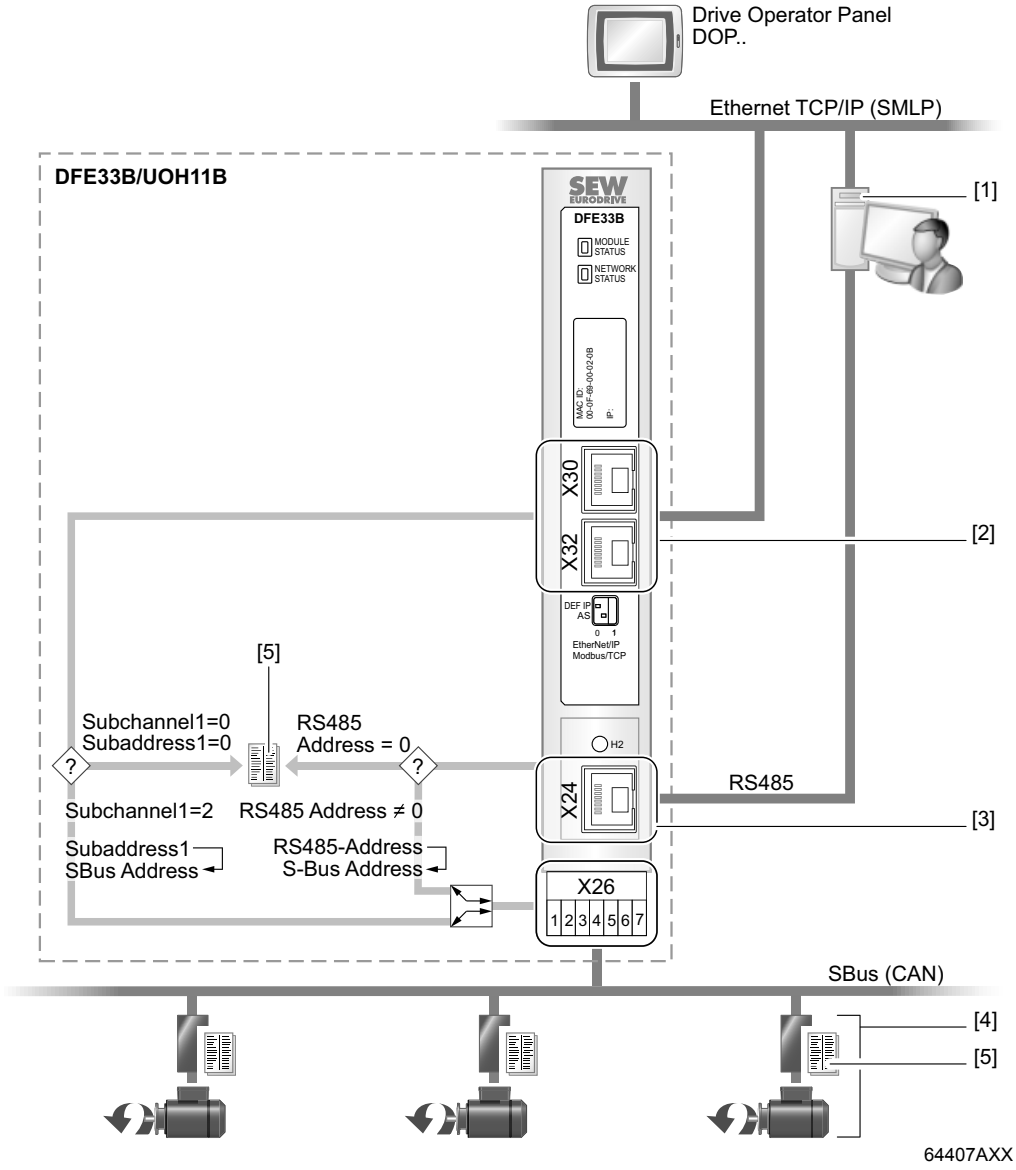
[1] PLC with EtherNet/IP scanner (master)
[2] Industrial Ethernet interface
[4] SEW inverter with SBus interface
[5] Index and parameter list of the unit

14.2 Parameter access to lower-level units via Modbus/TCP



[1] PLC with Modbus/TCP master
[2] Industrial Ethernet interface
[4] SEW inverter with SBus interface
[5] Index and parameter list of the unit

14.3 Parameter access to lower-level units via engineering interfaces



[1] Engineering PC with Ethernet and/or serial interface
[2] Industrial Ethernet interface (for engineering)
[3] Engineering interface (RS485)
[4] SEW inverter with SBus interface
[5] Index and parameter list of the unit

14.4 Glossary

Term	Meaning
DHCP	**D**ynamic **H**ost **C**onfiguration **P**rotocol. Allows you to allocate an IP address and additional configuration parameters for automation components in a network via a server.
TCP	**T**ransmission **C**ontrol **P**rotocol. Acknowledged connection-oriented transport protocol.
UDP	**U**ser **D**atagram **P**rotocol. Non-acknowledged, connectionless transport protocol.
IP	**I**nternet **P**rotocol. Protocol for data transport in the Internet.
IP address	An IP address consists of 32 bits divided into four so called octets containing 8 bits each for the sake of clarity. These values are displayed as four decimal numbers separated by decimal points, for example, "192.168.1.1". An IP address is subdivided into the network section (net ID) and the node address (host ID)
Subnetwork mask	The subnetwork mask establishes which part of the IP address is used to address the network and which part is used to address a station (host). All bits set to 1 in the subnetwork mask represent the network part (net ID); all bits set to 0 represent the node address (host ID). In a class B network, for example, the subnetwork mask is 255.255.0.0; that is, the first two bytes of the IP address identify the network.
Standard gateway	IP address of the station in the subnetwork that establishes a connection to other networks.
Client	Application that uses the services from another computer. Example: A controller uses a service from the DFE33B option for acyclic data exchange.
Server	Application on a computer that offers services to other computers. Example: The DFE33B option offers a controller the service for acyclic process data exchange.
Broadcast	A broadcast is a transmission to all stations within a distribution list or network.
STP	**S**hielded **T**wisted **P**air.
UTP	**U**nshielded **T**wisted **P**air.

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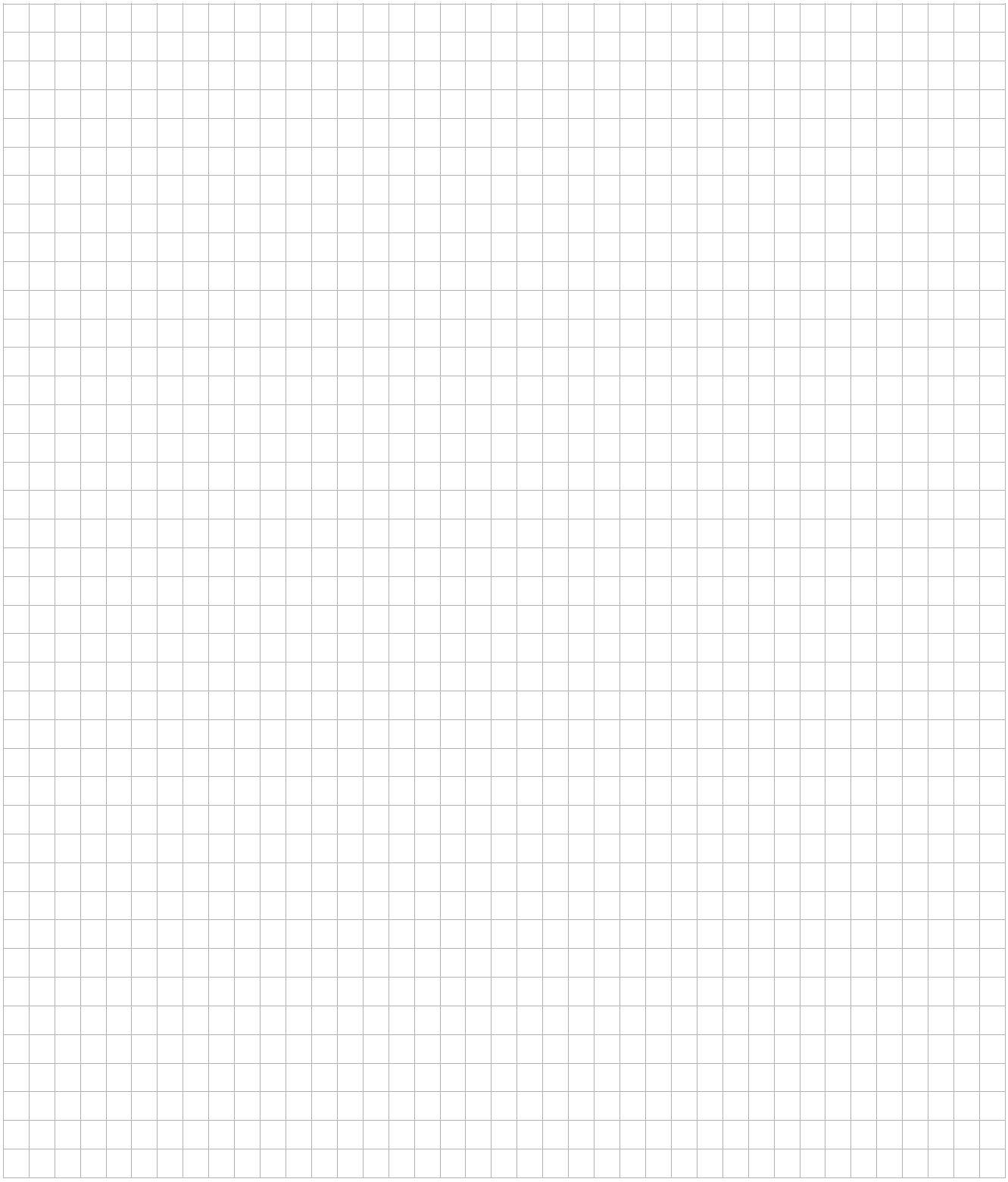

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